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Railway & Commercial Gazette

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LONDON, NOVEMBER 23, 1951

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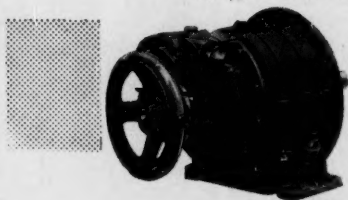
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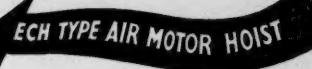
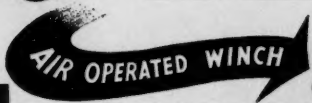
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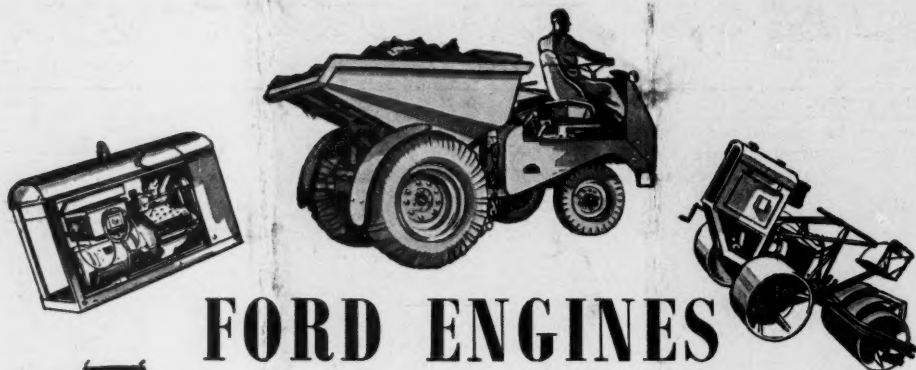
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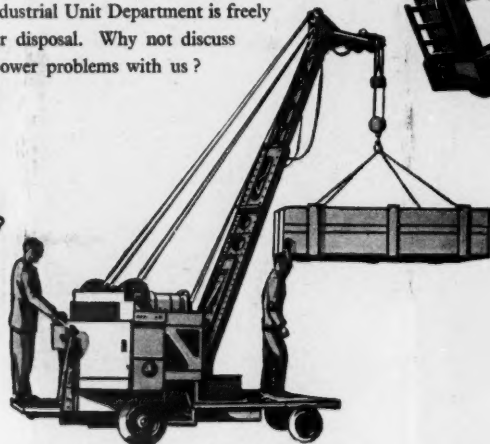
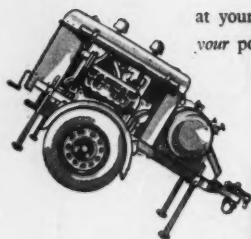


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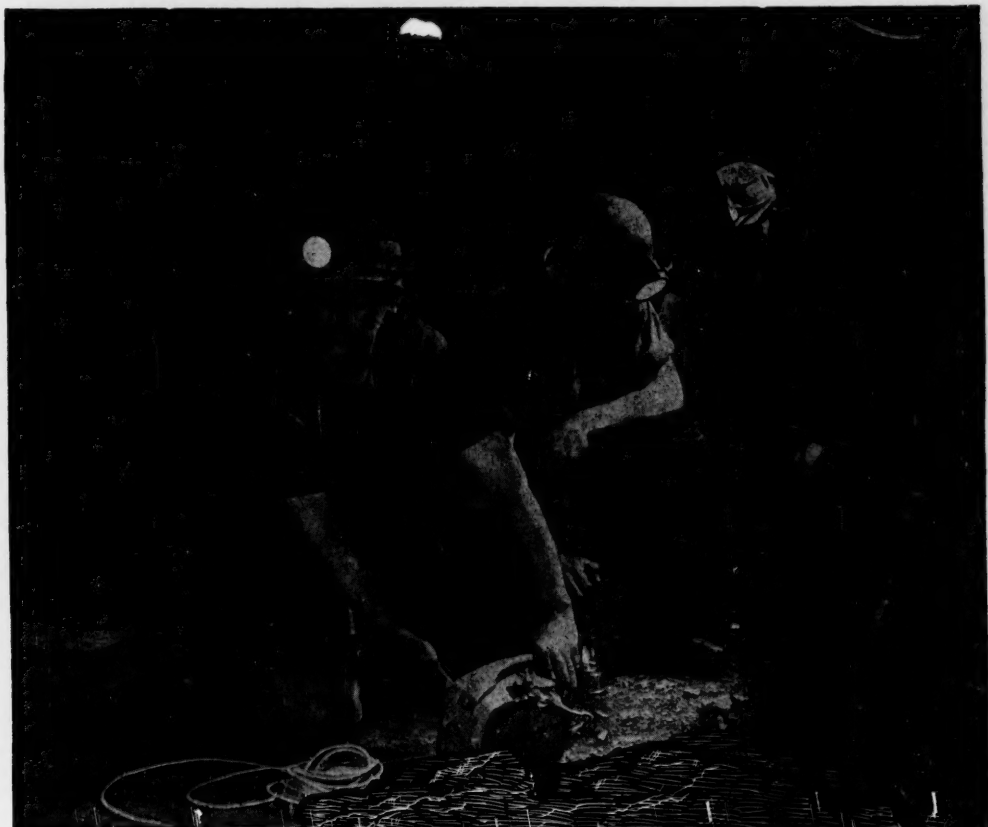
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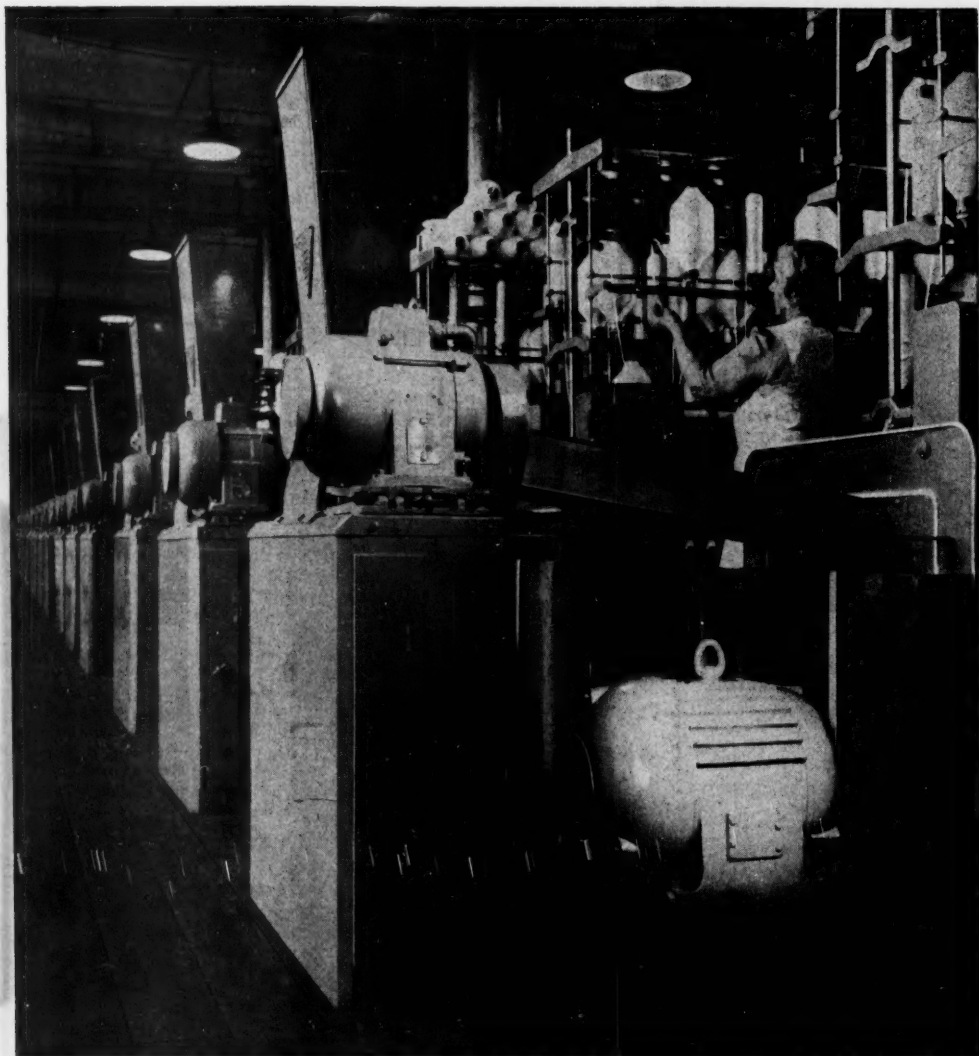
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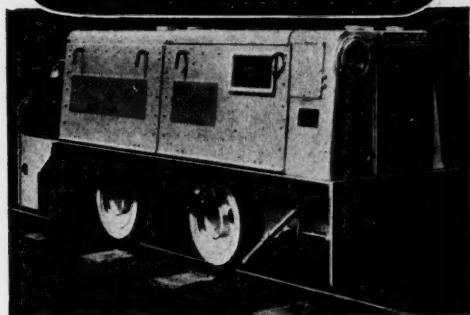
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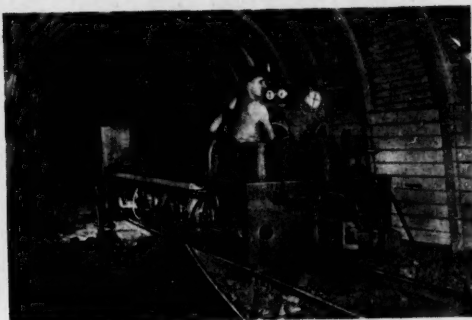
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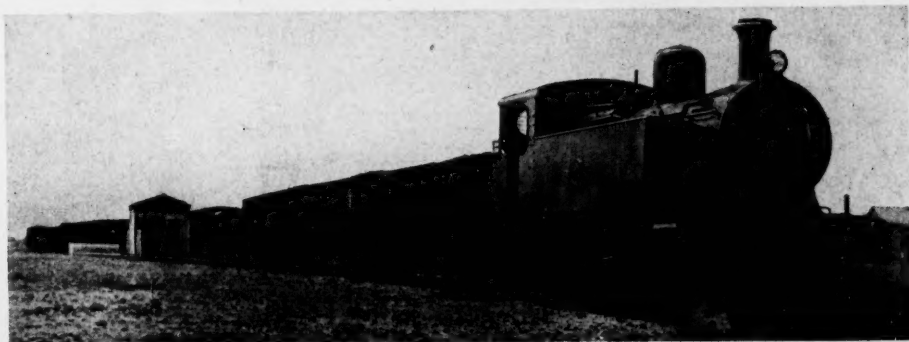
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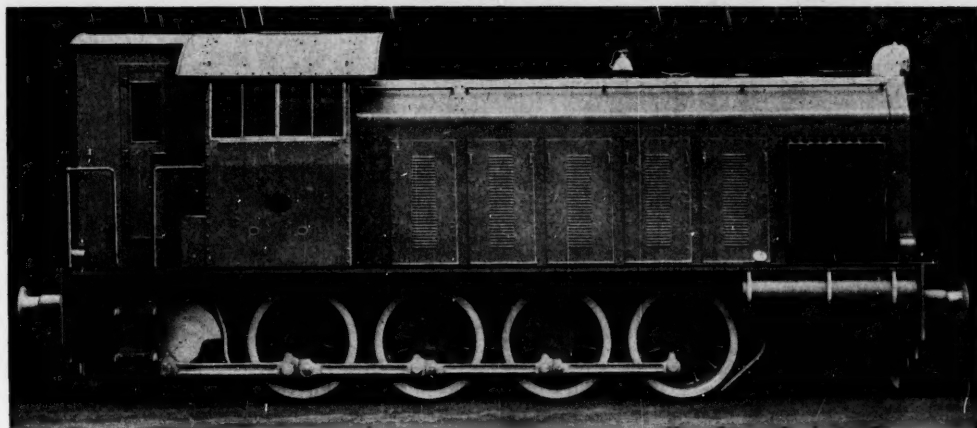
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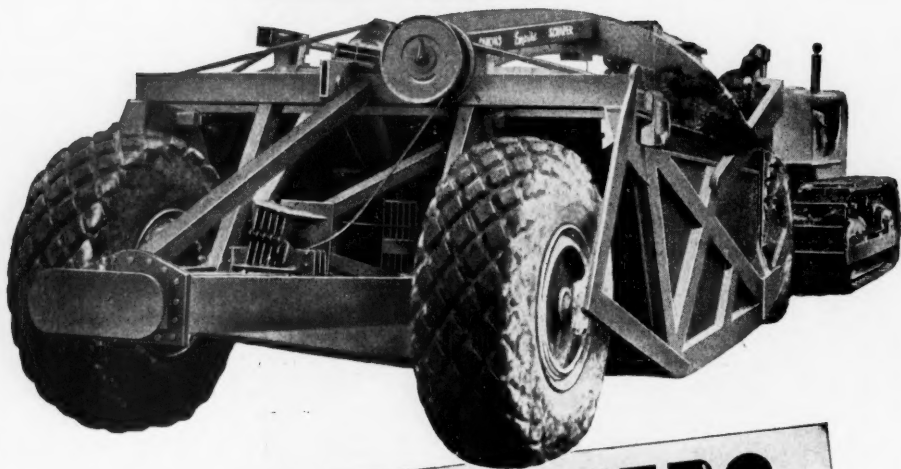
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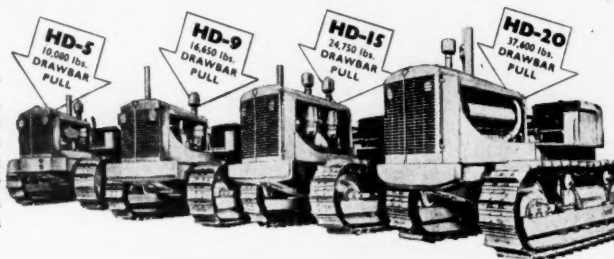
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CONTENTS

Notes and Comments	517	Company News and Views	533
From Our Own Correspondent	518	Goldfields Group Increase Profits; Goldfields	
Norway; Belgian Congo.		Rhodesian Higher Investment Income; Venterspost	
Defence Metals Conservation and Substitution	520	Distributes Less; North Kalgurli Strengthens its	
Semi-Pilot-Plant Investigations on Electrowinning		Reserves; Lampa Mining Pays 10 per cent; A Plain	
Manganese from Chloride Electrolytes	523	Man's Guide to Gold Shares Valuation.	
Reviews	524	Company Shorts	535
Machinery and Equipment	525	Company Meetings and Announcements	536
Metals, Minerals and Alloys	526	Johannesburg Consolidated Investment Co.;	
The Mining Markets	529	Blyvooruitzicht Mining Co.; Consolidated Main	
Rand and O.F.S. Quartermiles	530	Reef and Estates; New Modderfontein Gold Mining	
K.G.F. Companies Make Good Progress	532	Co.; Anglo Transvaal Consol. Investment; Amalgamated	
		Tin Mines of Nigeria; Witbank Colliery, Ltd.	

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NOTES AND COMMENTS

Chile's Mineral Industry in 1950

Mining activity in Chile, which was at low ebb during the early part of 1950, responded to improvement in world minerals markets later in the year but, according to the June issue of *Mineral Trade Notes* of the U.S. Bureau of Mines, the general weighted index of mining production for the ten-month period still stood at 104.5 (1937=100) at the end of October, compared with 108.2 for 1949 and 124.8 for 1948. Steady production during the final months of the year, however, made it possible that the level reported for the full year 1950 would match that of 1949.

Poor copper and nitrate markets early in 1950 discouraged output, but a sharp rise in demand brought with it an upswing in output as the year advanced. Labour difficulties, however, seriously affected production in both industries. Coal, iron, and gold were firm throughout the year, and for the first time substantial quantities of petroleum were drawn from the Magallanes fields.

As in 1949, the small- and medium-size mining industry contended that the Caja de Credito Minero (Mining Credit Institute) has been unable to purchase more than a fraction of the minerals offered for sale and that payment for purchases made was often delayed, and it was asserted that inadequacy of processing facilities resulting in immobilization of funds in heavy stockpiles was responsible for this situation.

Chilean miners looked hopefully towards the completion of the Paipote National Smelter for copper and gold ores anticipated in late 1951, but the smelter itself faces a somewhat uncertain future as it will have a capacity of 110,000 tonnes of concentrates, far in excess of the entire current output of the small and medium mining industry.

Some increase in mine output resulted from the improved copper price, unusually attractive contracts offered by ore buyers, and the fact that, at the end of the year small and medium miners were authorized to convert dollars to pesos at the free market rate of exchange. This action resulted also in an increase in demand for nitrate.

As regards manganese ore, the only commercial producer is the Corral Quemada mine of Cia. Minera Manganos de Atacama, which produced 24,523 tonnes of 46 to 50

per cent ore in 1950, compared with 25,968 tonnes in 1949 and 22,119 tonnes in 1948. Production by small manganese mines is controlled by Fabrica Nacional de Carburo y Metallurgica and averages about 2,000 to 3,000 tonnes annually. Exports of manganese ore from these mines exceeded 1,500 tonnes in 1950.

Production of ferromanganese by Fabrica Nacional de Carburo y Metallurgica continued at 50 per cent of the 12,000-ton annual rated capacity. The company plans to build a new plant at Huachipato. Chile exports considerable quantities of ferromanganese, but with completion of the Huachipato steelworks, has become an importer of ferromanganese. The steelworks require about 1,000 tons annually of low-carbon ferromanganese, whereas the Chilean products contains 5 to 7 per cent carbon.

Chile also produces a variety of non-metallic minerals, which figure only rarely and in small quantities as export items. Nearly all these minerals are produced by small mines scattered over the north of the country, and production statistics are usually incomplete and gathered after considerable delay. Therefore, no exact data for 1950 are available at present on these items.

Sulphur exists in quantity but, as production costs are high, only a small tonnage is produced. The Department of Mines and Petroleum reports that the most important users are vintners and that considerable quantities are also used in the manufacture of explosives. Sulphur is rarely exported from Chile, but in October, 1950, 3,000 tons of granulated sulphur were shipped to Argentina.

Wolfram in Uganda

Wolfram was first discovered in the Kigezi district of south-west Uganda in 1931, but none was exported until 1936, states a recent publication received from the U.S. Bureau of Mines. The wolfram (ferberite) belt comprises an extensive area to the west of Kabale and extends to the south into Ruanda Urundi. Prospecting has been carried on since 1944 by local inhabitants with limited knowledge and capital and no general geologic appraisal of the area has been made. The ferberite discovered to date occurs in quartz veins in the foothill area of the Ruwenzori Range, the veins varying in width from a few inches to

six feet, surrounded by extensive bands of blue-grey and black phyllitic shales. Ferberite occurs as thin stringers, globular masses, and occasionally in the form of octahedral crystals. The largest individual mass found was 120 lb. The ferberite is sometimes altered to hydrated tungstic oxide of different shades of yellow and green and varying from an aggregate on minute scales to globules. Metamorphic activity has rendered the geology of the area extremely complex with continuous faulting and folding of strata. Although limited exploration has been carried out, mineralization is not believed to continue below the base of the tungsten-bearing hills.

Mining is by pick and shovel. Hand sorting is done at the mine, and further recovery is made through hand crushing and panning. Recovery is estimated at 50 per cent, with each property containing large tailing dumps, which cannot be worked by hand operation. Of the six mining properties in this area, four are now installing compressors and pneumatic drills. For instance, the Mpororo mine is installing three Humphrey spirals and has a Denver jig and a Roll jaw crusher on order. The property was acquired in April, 1950, by London and Scandinavian Metallurgical, Ltd. Prospecting has been limited primarily through lack of capital. Other factors have been moderately difficult terrain and the absence of outcrops as a result of heavy overburden and lava flows.

Tungsten output by individual mines in the Kigezi district, Uganda, during the last five years was as follows (in long tons): 1946, 78.4; 1947, 130.9; 1948, 151.2; 1949, 164.9; and 1950, 130.45.

The Uganda Government is reported to favour large-scale exploitation in the Kigezi area by large companies. Present operators, with the exception of Mpororo, are incapable of large scale development and recovery from present primitive methods is wasteful.

Indian Ilmenite

Extensive deposits of ilmenite sands found in the Ratnagiri District, Bombay State, are expected to offer India a leading position in titanium—a valuable and rare metal used in the manufacture of armaments, paints and in the delustering of viscose rayon, writes our Indian Correspondent. At present, India produces annually a little over 200,000 tons of ilmenite, almost all of it in Travancore in South India. Travancore also produces titanium dioxide.

Ilmenite sands found in Bombay State are stated to contain up to 50 per cent titanium. Exploitation of ilmenite sands will begin immediately and, to begin with, about 1,500 tons will be available for export and prospectors hope to increase ilmenite output to 5,000 tons a month by 1952.

Almost all countries buy ilmenite from India, the major buyers being the United States of America, Japan, and European countries. The only other country producing ilmenite and titanium in exportable quantities is Spain, which, however, ranks a poor second to India in the production of this mineral.

Canada has, however, recently developed a mine in Quebec, claimed to be the world's largest deposit of ilmenite. Canadian mining engineers estimate the mine to possess a reserve of 200,000,000 tons of ore, which runs 40 per cent iron and 35 per cent titanium oxide. The mine, which, however, ranks a poor second to India in the expected to produce about 500,000 tons by the end of this year.

Indian experts believe that the country can increase ilmenite production to 500,000 tons, if there is sufficient demand. Indian ilmenite is considered to be of better quality than that produced in the rest of the world. Besides Travancore and Bombay, smaller quantities of ilmenite have been found in Saurashtra. Production of titanium in Bombay will not be possible for some time to come because of the huge capital needed, but it will be exported after a

process of separation from the sands. This process has, however, to be suspended during the monsoon period—an important factor interfering with production.

Travancore is supplying to the world two grades of the mineral guaranteed to contain not less than 53 per cent of titanium dioxide, the largest demand being for the manufacture of titanium dioxide. According to prospectors in Bombay, a European country has already contracted to purchase 1,500 tons of ilmenite from Ratnagiri. The ilmenite exploitation, to start with, will be in Malgund village, Ratnagiri District, where about 2,000 workers will be employed.

The Travancore-Cochin Legislative Assembly voted a supplementary estimate of Rs.1,091,000 for additional working expenses for Government-owned mineral concerns. The Government hopes to produce 70,000 tons of ilmenite during the remainder of the financial year.

New Minting of Sovereigns

A new minting of sovereigns is to be started shortly at the Royal Mint. They will be struck from existing dies (year 1925, bearing the head of King George V) and will not be issued for circulation but will remain part of the gold reserves. It may be recalled that in 1949, the Royal Mint struck a number of gold sovereigns to preserve their inherited knowledge and craftsmanship, since gold coining requires a different technique from coining in other metals, and greater precision of workmanship and it was then stated that further mintings might take place for the same purpose.

Mineral Prospects in Northern Norway

(From Our Own Correspondent)

Oslo, November 9

In *The Mining Journal*, September 28, reference was made to plans for developing the mining industry in Northern Norway. Production of ore in 1949 was: iron pyrites, 138,440 tonnes; copper concentrates, 14,078, zinc concentrates, 6,663, and lead concentrate, 464 tonnes. Iron pyrites and copper are produced by the Sulitjelma and Björkasen Mines and though Mofjellet produces some as by-products, zinc and lead ore are its principal output.

Sulitjelma has developed and probable ore reserves for 40 years, but those of Björkasen are expected to be exhausted in five or six years. The new Bleikvassli mine in Korgen and the Husvik mine in Tjøtta hold possibilities for extended operations.

Work has been started on a lead and zinc deposit at Bleikvassli and the yearly output target fixed at 10,000 tonnes of sorted ore for transport to Mo-i-Rana for further concentration. Sydvaranger at Kirkenes is expected to start operations about next summer. The State has given extensive support to the industry in Norway with loans and guarantees. The re-erection of the Sydvaranger plant is expected to cost Kr. 176,000,000, and plans have been made to increase the output from 270,000 to around 330,000 tonnes, but an increase in the output depends on additional electric power, the supply of which has already become somewhat precarious, as with operations steadily deepening more power is needed.

Probably the most important points at present are the re-opening of the Dunderland iron-ore deposits, the Jennestad graphite field and the Vaddas pyrite deposits.

All the iron-ore deposits in the Dunderland Valley have been transferred to the Norsk Bergverk. Drilling and prospecting have shown sufficient ore to support an output of some 2,000,000 tonnes of raw ore annually for a number

of years. Planning of a production plant will probably take about two years and plant erection about three years, or five years in all from the start of operations. When fully at work the project will employ about 1,000 men, and yield an output of some 800,000 tonnes of schlich a year. The output at first may only be about half this amount. Rich iron ore has been steadily rising in price and schlich of the quality indicated realizes to-day about Kr. 70-75 per tonne f.o.b. At Vaddas the chief ore occurrence is pyrrhotite, yielding sulphur from coper and iron pyrites. In the past it has been the subject of extensive investigations and when development was stopped in 1920, 180,000 tonnes of pyrites had been developed and 1,300,000 tonnes proved. Pyrites runs approximately 26 per cent sulphur and about 1 per cent copper which will be concentrated to about 42 per cent sulphur. It is hoped that the present investigations, towards which Parliament has granted Kr. 500,000, will be completed before the end of next year to be followed as soon as possible by plans for operating.

During last summer geological and geophysical studies were carried out in northern Norway more particularly of lead-zinc-silver lodes at Svenningdalen and of the Rubben manganese deposit in Malselv and of pyrites and iron-ore deposits on Andøya. There are a number of other pyrites deposits in Northern Norway which should be more closely investigated, as well as several smaller deposits of iron-ore on Hinnøy, Bø, Hadsel and Elsfjord as well as nickel deposits in Ballangen and numerous copper ore occurrences in Kvaenangen-Lyngen. Northern Norway possesses graphite deposits of which the Skland graphite works are the most important. These produced about 2,500 tonnes of graphite in 1949. Another deposit which was under examination both previous and since the war is Jennestad. Here there have been shown to exist several suitable occurrences of graphite ore which can be concentrated to a middle product.

Oil Prospecting in the Belgian Congo

(From Our Own Correspondent)

Brussels, November 19

A few days ago, it was reported that the British were about to prospect for oil in the Lake Albert district and in the Semliki Valley, both of which are shared between Uganda and the Belgian Congo. Consequently, it may be of interest to give the story of prospecting for oil in that part of the Great Rift Valley.

Over a quarter of a century ago, Baron Boris Noldé, an officer of the late Imperial Russian Navy, entrusted by the Kilo-Moto Gold Mines Co. (of Brussels) with the task of supplying it with fish for its native labour, once noticed oil seepages on Lake Albert, while he was fishing there. As the Baron told me on his return to Belgium, he was quite surprised with this sight, because they were no motorboats on the Lake, no air lines flying over it and no independent flights had taken place and he enquired of the natives manning his smack whether they had already seen such seepages. On their affirmative reply, he ordered them to bring the boat to such spots. He was then taken to a part of the Lake shore beneath Mount Ari, a 2,184 metre mountain on the Western (Belgian) side of the Lake (which is 618 metres above sea level), and there he found plenty of oil indications. Thereupon he interrupted the fishing and returned at once to the African headquarters of the Kilo-Moto Mines.

Kilo-Moto then sent geologists and mining engineers to the spots indicated who confirmed the discovery, but while

Kilo-Moto had the right to search for, and eventually to work, gold and other propositions, oil was not included in its charter. So, it applied to Louis Franck, the then Belgian Colonial Minister, for the right to work any oil it should discover within its concession which included Lake Albert's western shores. As the Kilo-Moto concession is a huge one and as protests had already been made by the Socialist Party against its extent, Louis Franck declined to grant this demand, but authorized Kilo-Moto to continue the search, promising it should have an interest in any company that should be formed, if oil were discovered in paying quantity.

However, news of the oil discovery had reached the Uganda shores of the Lake and searches were undertaken from the British side and a seepage was discovered at, or off, Kibero, south of the Uganda port of Butiaba.

Then, the Anglo-Persian (since known as the Anglo-Iranian) approached the Belgian Government in order to get an oil concession on the Belgian side of the Lake. Its demand was declined because Kilo-Moto was then entrusted with these searches. But the Anglo-Persian insisted, stating it was willing that its eventual discoveries should not entitle it to the right to work them, because its investigations would be undertaken only in order to ascertain the importance of the oil layer under the Lake and its basin. This demand was then granted, on the condition, however, that the Belgians should enjoy similar rights in Uganda.

I am not aware of effective searches being carried out by the Anglo-Persian in Belgian Congo territory or of searches carried out by Belgians in Uganda, but I do know that oil was discovered by Belgians at Laba, a Belgian place on Lake Albert, some 12 kilometres to the N.E. of the initial discovery. On the British side, oil was discovered at Kibuku, in the Semliki Valley, a southern tributary of Lake Albert.

Kilo-Moto had also dispatched to the Semliki Valley a Belgian engineer, experienced in oil prospecting, but this gentleman caught haematuria in the marshes of this horrible valley (a crocodile paradise), and was brought back to Belgium where he died shortly after his return. Of course, the whole of this covered much more time than is requisite to narrate it.

At last, a syndicate was formed at Brussels to prospect on a large scale for oil in that N.E. part of the Congo. That syndicate was headed by Mr. Hallet, chairman of the Brussels' Banque des Colonies and of a lot of rubber and palm trees growing companies in the Congo, Malaya, Indo China and the Dutch East Indies. Mr. Hallet entrusted the technical direction of the syndicate to Professor Errera, a Belgian scientist of repute and professor at the Brussels University. Errera sent technicians to the Congo and ordered drills in Birmingham. Shortly after the Second World War broke out, and the Birmingham works had reluctantly to inform him they could no longer carry out his order and were quite unable to forecast when they could. Consequently, Errera recalled his party.

Shortly after the war came to its end, Hallet passed away and his widow and heirs informed the Belgian Government they were renouncing the rights granted them.

NEW BELGIAN SYNDICATE FORMED

A huge Belgian syndicate was formed last year to search for oil in the Central Congo notably in the Boende country, where it hopes to discover interesting oil propositions.

Elsewhere, the Brussels Forminière (the big diamond corporation) is still looking for oil in Mayumbe (Lower Congo). But these searches were and are being carried out quietly, because the Forminière is still awaiting the results of the borings made in the Gaboons (French Equatorial Africa) by the French and in Angola, by a syndicate headed by Sinclair in which the Forminière is interested. Mayumbe is located between the Gaboons and Angola.

Defence Metal Conservation and Substitution

By K. P. HARTEN (German Iron & Steel Institute)

The world shortage of essential and strategic metals, their conservation and substitution, are assuming increasing importance, especially in this country, and the following paper on this important subject, which was delivered on October 14 at the World Metallurgical Congress, Detroit, will undoubtedly be read with close attention. It was read in Mr. Harten's absence by Mr. Fritz Engelmänn of the Ministry of Economics, Bonn.

The progress of civilization and engineering has caused a steady increase in the consumption of all known metals to such an extent that the discovery and development of new sources of supply cannot always keep pace with the demand. If, in addition to this normal trend, an extraordinary demand arises, such as the necessity to prepare for the defence of freedom, a shortage of the most essential metals is likely to arise all over the world. Military equipment must utilize not only the most up-to-date processes, but the best and most modern materials as well. Measures to conserve metals will be particularly necessary if a country is deficient in raw materials and if there is the risk that supplies from abroad will be held up.

Metals which will have to be rationed and saved are not the same for all nations. Generally, however, in all countries cobalt, copper, chromium, manganese, molybdenum, nickel, columbium and tungsten will be in short supply. The following comments will be confined to these metals, and examples will be given from the experiences gained in Germany.

CO-OPERATION OF CONSUMERS

Usually a consumer chooses his material in such a way that purchase and maintenance together represent the least cost. Frequently, he does not have dependable performance data and knowledge, so he will not generally be able to arrive at a positive and correct decision. Cautiously he continues to use the materials he is accustomed to and is not inclined to switch over to the new materials until a sufficient amount of experimental data has been gathered to ensure that the new material is no longer endangered by a particular risk. How long the introduction of a new steel may be delayed by those considerations is indicated by the example of high speed molybdenum steel, which has proved to be the substantial equivalent of the conventional tungsten steels. In many cases, a decision will naturally be easier and measures of conservation will be put in operation more quickly if dependable short-time tests are available. The search for these tests is a most important task. A good example of a short-time test is the valuable contribution of the end quenching test of W. E. Jominy and A. L. Boegehold. This test greatly shortened the time necessary to substitute steel series 86XX and 87XX (American Iron and Steel Institute) for steels relatively high in nickel.

The correct selection of a material pre-supposes considerable knowledge of the conditions actually encountered in its use as well as of the capability of the material to withstand the stresses. The users may be able to contribute quite a lot to the conversion of metals in short supply if they consider carefully which material will yield the highest possible performance per unit of alloy addition. It is, for instance, the wrong way from the standpoint of conservation to select a high speed steel according to the most severe conditions of operation encountered in service, whereas perhaps these may cover only a small proportion of the actual uses. Prolonged investigations carried out in German plants have led to the decision to use the so-called ABC-III steel, having approximately 2.5 per cent molybdenum, 2.5 per cent vanadium, and 3.0 per cent tungsten, to a great extent, since with the usual cross-sections of chip and cutting speeds, it is often the most favourable to use even from the standpoint of plant economy.

An adaptation of the material to the particular use

involved—which would be in the interest of the optimum utilization of a strategic metal—is certain to result in a larger number of types which, in itself, has some undesirable consequences. The quantities of material in stock will increase; not only is there danger of confusion, but usually also different treatments may be specified for the different grades. It is a difficult task to determine the point where the advantages of conservation outweigh these drawbacks. It may be mentioned that steels with a smaller content of alloy usually require greater care in their heat treatment in order to use them to best advantage. Furthermore, proper quenching and tempering temperatures ranges will be narrower and sometimes higher, requiring a more accurate adjustment of temperatures and perhaps also more attention will have to be paid to decarburization and scaling.

CONSERVATION IN PROCESSING AND DESIGNING

Every manufacturer of a structure, apparatus or appliance endeavours to obtain as many finished articles from the material supplied as may be possible. In this effort, however, he will have to keep costs at a low level. In some cases a method of processing requiring a higher consumption of materials will be more economical. This is usually true, for instance, for tools which can be made either entirely of high alloy steel or may be designed as composite tools. In the latter case, the working edges of a higher alloy material are welded or inserted on a body of plain carbon or low alloy steel. It may happen then that the composite tool will be more expensive because of a larger labour content, but that its performance will not compensate for the higher cost of manufacture. Thus such measures of conservation pre-suppose intelligent planning and allocating. Similar conditions may be valid also for the use of plated materials as substitutes for solid materials. With thin sheets, having a correspondingly thinner plating, the fabrication, for instance, may be so much more expensive that the entire appliance of plated sheets will cost more than if it had been made completely of stainless steel. Below certain thicknesses, for which 0.20 in. is used in Germany, one should usually dispense with plating.

Considering the guarantee for sound performance which manufacturers of apparatus are compelled to grant over long periods of time in certain circumstances, they sometimes are very reluctant to adopt conservation measures. Therefore, much depends on the endeavours to overcome these obstacles by providing dependable design data established in joint co-operation and checked by the authorities. This is true particularly for steam boilers and high pressure containers which are held to strict specifications for the prevention of accidents. These rules should be looked over generally to find out whether they do not specify unnecessarily high safety allowances and, therefore, heavier weights and higher contents of alloys than are justified, especially in a national emergency.

IMPORTANCE OF SCRAP ECONOMY

A remarkable contribution to the conservation of metals important for national defence could be achieved by the processing firms with only a small amount of extra work if they would carefully separate the scrap produced by them into grades or at least into groups and send it back to the producers of the materials or to central collection places. In doing this, they would create the possibility of

recovering the alloys from a large portion of the new scrap which otherwise would be lost in mixtures of unknown composition. A somewhat more expensive way is to melt this scrap without refining and to then determine its exact analysis. This procedure will be worth the trouble, doubtless, for expensive alloy elements such as molybdenum, nickel and tungsten. In any case, the scrap economy is of particular importance to the conservation of alloys and the careful collection and separation of alloy scrap can be encouraged by suitable rewards.

CONSERVING MANGANESE

By first mentioning the possibilities of conservation within the plants of the users and processing firms, it is not meant to imply that they should bear the main brunt of the emergency measures. The main burden rests with the producers of the materials who will be held mainly responsible for the maintenance of quality. A material which may be said to be indispensable in the production of steel is manganese, of which rich ore deposits are lacking in Western Europe as well as in North America. That is the reason why our countries are of one mind in the endeavour to use the deoxidation and alloy agents with a high content of manganese as sparingly as possible. German specifications to conserve manganese in blast furnace and steel plants may, for the production of the various pig iron and steel grades, call only for the manganese carrier of the lowest content of manganese which will yield the desired carbon and manganese in the finished product. For the smelting of basic Bessemer pig iron, the manganese content of which is about 0.6 per cent in Germany, no ore is allowed to be used having more than about 2 per cent of manganese. For the deoxidation of the conventional basic Bessemer steel containing ordinarily more than 0.05 per cent carbon with 0.3 to 0.8 per cent manganese and of open-hearth steels, having more than 0.12 per cent carbon and a maximum of 0.6 per cent manganese, only ferro-manganese with a maximum of 45 per cent manganese is allowed to be added. A preliminary deoxidation is carried out with spiegel or with a blast furnace manganese iron, containing 20 to 30 per cent manganese. For this deoxidation practice it is recommended that the deoxidizing alloys be added in the ladle in a liquid or a solid form, i.e., not in the furnace, in order to keep the melting losses as low as possible and to obtain the highest benefit from the deoxidation effect. Experiences during World War II showed that such a procedure is possible without impairment of the quality.

The recovery of the alloy content from the scrap has already been mentioned. Nearly all grades of steel can be melted to a sound quality in the open-hearth furnace as well as in the electric furnace with a more or less large proportion of scrap. Therefore, the plants should be urged to collect their own scrap carefully and to invite their consumers to return it. This practice obtains in many instances in normal times for economic reasons, but it should be used to a greater extent during an emergency period. In this respect, the grinding dust must not be overlooked but, of course, only special plants should be charged with the recovery treatments.

RECOVERY OF CHROMIUM

In the steel plant, a melting loss of more than 20 to 25 per cent, with the exception of columbium, tantalum and titanium and, in certain circumstances, also of vanadium, can be avoided by an adequate furnace and slagging practice. For the recovery of chromium which in the open-hearth furnace also oxidizes relatively easy, special slag reducing methods have been developed by Fried Krupp, W. Grundhofer and H. Knuppel. At the end of the refining action of the slag into which a more or less important part of the chromium has entered, calcium-silicon and

ferro-silicon are added and in some cases an additional amount of aluminium grit to the slag. A white slag is obtained, having a low content of carbide, similar to that of the electric furnace, from which the chromium will be reduced to an important extent. Naturally, when using this method, considerable amounts of high phosphorus slags must be withdrawn previously, which represents a considerable physical strain on the furnace crew. In times of emergency, however, there will be no other way out of this problem.

I should mention also the working of scrap from stainless chromium-nickel steels by using the oxygen lance in the electric furnace, without the carbon content attaining an inadmissible level. We have taken over this method from the United States and from England and have also found that with the aid of it, one succeeds in recovering from the scrap the nickel almost completely and about 80 to 90 per cent of the chromium.

It is not unjustified, of course, to count also on the recovery of vanadium from basic Bessemer pig iron among the measures which may be taken to save important alloying metals. Usually the high phosphorus ores contain vanadium so that, for instance, the basic Bessemer pig iron blown from Swedish ores, Minette or Salzgitter ores contains 0.09 to 0.15 per cent of vanadium. In the basic Bessemer slags or in the roof dust of basic Bessemer steel plants this vanadium will be concentrated to 0.4 to 0.6 per cent. During the war, the German basic Bessemer steel plants were required to deliver a certain amount of slag rich in vanadium without regard to the loss encountered in the steel production. In order to avoid a loss in the steel production in the converters, we are endeavouring at present to obtain preliminary refining slags with 2 to 4 per cent vanadium in the blast furnace trough or in ladle-like vessels by blowing in hot air or oxygen. The cost of the vanadium produced from the slag obtained by these concentration operations is obviously materially higher than the present price of vanadium recovered from commercial ores. Since, however, vanadium may be used in many cases as a substitute for tungsten, molybdenum and certain other alloys, the increase in cost may be justified especially if the shortage of alloying elements is sufficiently acute.

SWITCHING OVER TO NEW MATERIALS

This leads us to the problem of switching over to the new materials of which I want to give you a general survey on the basis of our tests and experiences for steel as well as for non-ferrous metals. For permanent magnet materials, high speed steels, wear-resisting deposit welds and cemented carbide alloys, cobalt is playing an important part. It can be dispensed with only in rare cases especially where an intentional impairment in quality is suffered. With cemented carbide alloys, for instance, experiments with nickel as an auxiliary metal have been made which clearly showed a decrease in tool performance.

A much more extended field of application is covered by molybdenum. Experts of the United States, where the major part of the molybdenum is produced, were the first to discover its favourable effect on steel and iron in a variety of ways and have fostered its diversified use, primarily by a wise price policy. In high speed steels, molybdenum can be replaced by tungsten, but usually it is more desirable to conserve tungsten than molybdenum. Replacement by vanadium alone or in combination with chromium or aluminium is not possible, at least at present. On the other hand, one succeeds in creating very useful high speed steels, low in strategic alloy constituents, by an intelligent balance of the molybdenum, tungsten and vanadium, as has been confirmed, for instance, by the experiences with the ABC-III steel.

In steels having high strength at elevated temperatures, molybdenum cannot be dispensed with. A saving in this

field can be achieved with best results by replacing part of the molybdenum with vanadium requiring, however, higher heat-treating temperatures, resulting in higher scaling and distortion during heat treatment. Considering the present state of our knowledge, a substitution should not be recommended in the case of heavy forgings, for instance, shafts and rotors for steam turbine sets, which, because of the required freedom from stresses, must be cooled slowly after reheating, and yet must not suffer from temper brittleness.

In the conventional heat-treating and case-hardening steels, molybdenum, of course, could be used only in special cases, and even less molybdenum will be needed if boron is available in sufficient amounts. The experiments and developments of American experts in this field have been confirmed in Germany.

For molybdenum stainless steels no adequate substitute for this alloying element is available. It may be possible in some cases to replace stainless steels by silicon cast-iron (with 16 per cent silicon) or by ceramic bodies, plastics or other non-metallic materials.

Columbium exerts a unique effect upon the creep strength of steels which cannot be attained by other alloying elements. It is, however, largely replaceable in stainless steels, in which the greatest part of it appears to have been used up to the present, by titanium. In many instances, by sufficiently reducing the carbon content of the stainless alloy, the troublesome intergranular corrosion can be avoided.

Nickel can be replaced by case-hardening and heat-treating steels with small cross-sections without any difficulty or its content can be at least lowered to such an extent that it may be built up from the scrap. With heavier sections, however, the favourable effect of nickel on deep hardening cannot be obtained in the same degree by other elements, such as, for instance, manganese.

In stainless steels the austenite forming elements, manganese and nitrogen, are not equivalent to nickel. Savings in nickel may be obtained, in some cases, by using stainless steels without nickel or with a greatly reduced nickel content, provided that the corrosive conditions are not too severe, but the processing of these substitute steels will generally be more difficult.

The last alloy element for steel which shall be mentioned here is tungsten, which can be replaced in high speed steels and tool steels to an ample extent by molybdenum and partly also by vanadium, as has been mentioned above. It cannot, however, be dispensed with in cemented carbide alloys.

CONSIDERATIONS REGARDING THE CONSERVATION OF NON-FERROUS METALS

In the field of non-ferrous metals, much experience has necessarily been gained in Germany, though such experience has been dearly bought. Affected by fashion, the consumer is accustomed to demand quite a luxurious appearance of the surface of his devices, which accounts for the big consumption of nickel and chromium plated parts in motor cycles, refrigerators, and so on. And yet copper, nickel and chromium are materials of first order shortage all over the world! Without being compelled to be deprived of a silver or chromium lustre, the consumer could save these valuable materials if he used chemically polished and electrolytically brightened pure aluminium (99.998 per cent) which could be obtained from ordinary aluminium scrap by a three-layer electrolysis (the Hoopers process) and hardened by certain alloy additions. With the same material, silver could be saved, for instance, in silver-plated reflectors. In the field of castings the consumer may use to good advantage secondary metals without the use of virgin metal. As an aid in this practice, new

tests for the quick determination of the castability have been developed.

The designer, of course, requires clear and definite specifications for materials which, in addition to the chemical analysis, also cover a comprehensive enumeration of the engineering properties. When switching over to new materials, for instance, to light metals or plastics, instructive examples are necessary showing the "correct" or "wrong" way to do the job. For plated materials the same principles apply to non-ferrous metals as to steel. An important saving of material is often possible by the use of "metal spraying," not only for repairs, but also for the protection of surfaces.

What has been said regarding the sorting of steel scrap, is valid, to an even greater extent, for non-ferrous metals. Separation of the scrap and painstaking sorting, for instance, by means of modern electric conductivity apparatus, are of as great importance as the metallurgical processes themselves. In general, the best overall results will be obtained by a systematic regeneration of the metal waste (scrap refining). This applies to light metal waste of all types as well as to heavy metal waste, including ashes and dross. It is possible to produce high quality secondary metals, meeting the standard specifications, from scrap by applying modern methods of refining. Thus, pure magnesium can be distilled from electron scrap (magnesium-aluminium alloy) and zinc scrap can be transformed in a simple and effective manner into high quality zinc alloys.

POSSIBILITIES OF REPLACEMENT IN THE FIELD OF NON-FERROUS METALS

In all countries almost half of the copper is consumed by the electrical industry. Here, particularly the high tension power lines or, largely, all electrical lines down to the house connection, can be replaced by aluminium, the steel-aluminium cables having turned out to be superior to the cables made of aluminium alloys. The same applies to street railway overhead lines. Contrasted to this, the replacement of electric wires inside houses, including telephone and telegraph wires, is not advisable. For these copper should be used. Instead of yellow brass, red brass or bronze light metal alloys can often be used as substitutes.

Important armatures, however, which now are made of copper, should not be made of aluminium or zinc. According to recent experience, nickel or chromium-plated brass parts may well be made of chemically and electrolytically brightened aluminium alloys made from high purity aluminium and such substitutions can sometimes result in an economic advantage.

As regards lead, we can see that to-day cable coverings are successfully replaced by plastics or light metal alloys. Even lead paints can largely be replaced by other paints or varnishes. In the construction of apparatus, we find to-day in many cases aluminium and plastics in the place of lead. In storage batteries, however, it cannot be dispensed with as yet.

Zinc can be saved partly by substituting light metals for zinc alloys, including brass, and substitutes for most zinc paints are available. For zinc sheets, different possibilities of replacement are available. More difficult, however, is the substitution in galvanizing steel parts. If zinc is in very short supply, steel coated with paints or lacquers may be substituted for many galvanized parts even though the latter would have a longer life.

Tin can be equally replaced in many cases, as shown by the experiences in World War II, by synthetic resin varnishes, plastics or by light metal alloys. It cannot be completely replaced, however, in solder alloys and bearing metals.

Semi-Pilot-Plant Investigations on Electrowinning Manganese from Chloride Electrolytes

By J. H. JACOBS, P. E. CHURCHWARD, T. E. HILL, Jr., W. H. CURRY, E. C. PERKINS, and O. Q. LEONE

In 1946 research was begun at the U.S. Bureau of Mines Electrometallurgical Laboratory at Boulder City, Nevada, to determine the possibility of electrowinning manganese from chloride electrolytes on a continuous basis. All phases of electrodeposition were investigated on a small scale in the laboratory. These results indicated that a chloride process had certain possible advantages over the sulphate process that made it worthwhile to continue the investigation on a semi-pilot-plant basis, and the results of this work are given in U.S. Bureau of Mines *Report of Investigations* 4817. All the authors are members of the staff of the U.S. Bureau of Mines, Boulder City. In this issue we reprint extracts from the report dealing with ore preparation and purification of the leached solution. In a subsequent issue the electrolytic process will be described.

All solutions used in this investigation were prepared in a manner similar to that used for preparation of sulphate solution electrolysis. Ore containing 25 to 35 per cent Mn was used as the source of manganese. After crushing and grinding, the ore was given a reducing roast to reduce the MnO_2 to acid-soluble MnO . The reduced ore was leached with spent cell electrolyte containing HCl , NH_4Cl , and $MnCl_2$, and the residue was filtered and discarded. Impurities in the solution, such as copper, arsenic, zinc, nickel, and molybdenum, were removed as sulphides by precipitation caused by addition of hydrogen sulphide. After filtering, a small amount of $FeCl_3$ was added, and the solution was aerated until all the iron precipitated as the hydroxide. This removed colloidal sulphur and sulphides and any arsenic that might still remain. After filtering, this solution was ready for electrolysis.

Electrodeposition was carried out in a diaphragm cell with a daily capacity of about 15 to 20 lb., using graphite anodes and stainless steel cathodes. The solution discharged from the cell, designated as anolyte, was returned to leach more calcine.

The ore used in this investigation was from the Three Kids Mine, Las Vegas Wash, Clark County, Nev. The manganese is present as the dioxide, and the ore is an earthy material or wad mixed with small quantities of psilomelane and manganite. Minor amounts of quartz, mica, gypsum, decomposed turf, opal, and some undetermined silicates make up the non-metallic portion of the ore. It is a light, porous, amorphous-appearing mass that breaks into granular particles and slimes on wetting. Because of its extreme porosity, it can be reduced and acid-leached without fine grinding. Both high-grade and low-grade ores were used.

Although only the Three Kids ore was used for this work, electrolytic manganese has been made successfully in the laboratory from several others, including low-grade oxide ores and carbonate ores. As it is always necessary to electrolyze from a pure solution, the principal problem involved in changing from one ore to another is modification of the solution-preparation scheme to insure removal of all impurities.

CRUSHING, GRINDING, AND ROASTING

The ore was crushed, ground, and reduced in the same manner as in the sulphate process, which has been described in detail by J. H. Jacobs, and others, "Operation of Electrolytic Manganese Pilot Plant," Boulder City, Nev.: Bureau of Mines *Bull.* 463, 1946, 169 pp. The ore was crushed through $\frac{1}{2}$ in. by a jaw crusher and rolls and then ground to 95 per cent through a 35-mesh in a Hardinge Thermomill.

Calcine was originally reduced by roasting in a 5 ft. diameter, 10-hearth Skinner furnace, using oil as the reducing agent. As ore requirements for this investigation were comparatively small, roasting was conducted later in a 6 in. diameter by 12 ft. tube furnace. Propane was used as the reducing agent. Calcine prepared in the

indirectly heated tube furnace was comparable to that previously made in the large Skinner hearth furnace, 97 to 98 per cent of the manganese being soluble in dilute sulphuric acid.

Calcine was leached in 500 gallon batches in 5 ft. x 5 ft. wood tanks containing a 12 in. rubber-covered, steel, ship-type agitator. Anolyte from the cell operation, containing 16 grammes manganese, 60 to 90 grammes ammonium chloride, and 50 to 78 grammes hydrochloric acid per litre, was drawn into the leach tank, and necessary make-up hydrochloric acid and ammonium chloride were added. Enough calcine was then added to give the final desired manganese concentration, usually 56 to 58 grammes per litre. Leaching was continued until the maximum manganese had been extracted at a pH of 2.5 to 3.0. Manganese extraction at this pH averaged 96 to 98 per cent.

After the leach was finished at a pH of 2.5, it had to be neutralized to a pH of 6.5. This could be done by adding either ammonia or calcine. When calcine was used as the neutralizing agent, the over-all manganese extraction was lowered from 98 to as low as 80 per cent because of the poor solubility of the calcine as the pH increases. When ammonia gas was used for neutralization, the over-all leach extraction was 92 to 94 per cent, which resulted in a considerable saving of manganese. From 20 to 25 lb. of ammonia was required to neutralize a 500 gallon leach. As will be shown later, ammonia had to be added to the circuit to replace nitrogen losses at the anode; therefore, ammonia was the most desirable neutralizing agent.

The solution concentration, after leaching under normal conditions, was 100 grammes ammonium chloride and 56 to 60 grammes manganese per litre as the chloride. The principal impurities leached from Three Kids ore were arsenic, lead, nickel, molybdenum, copper, iron, magnesium, potassium, sodium, and calcium. A typical analysis of high-grade Three Kids calcine, leach solution concentrations, and neutral leach extraction is shown in the following table.

Analyses of Calcine and Leach Solutions

Constituent	Calcine per cent	Grammes per litre		Extracted in neutral leach per 1,000 lb. Mn., lb.
		Acid leach solution	Neutral leach solutions	
Mn	36.6	69.3	60.7	—
NH_4Cl	—	98.0	106.0	—
Fe	1.62	0.04	0.04	0.65
Cu	0.33	0.90	0.65	10.7
Pb	2.55	1.68	1.47	24.2
Al_2SO_4	4.73	0.42	0.02	0.32
SiO_2	26.41	0.06	0.008	0.13
Na	0.88	0.86	0.80	13.2
Mg	1.67	1.94	1.70	28.0
K	1.99	1.69	1.51	24.9
Ca	2.04	1.50	0.84	13.9
As	0.13	0.0003	0.00004	0.0007
Mo	0.25	0.0002	0.0002	0.003
SO_4	2.26	0.20	0.17	2.8
Ni	0.009	0.012	0.011	0.18

The neutral leach slurry contained about 6 per cent solids when calcine was leached as shown in the above table. For lower-grade calcine, the percentage of solids was proportionately higher. The specific gravity of the leach residue was 2.0, and that of the solution was 1.17.

The theoretical hydrochloric acid requirement for leaching manganese is 1.33 lb. per lb. of manganese. In practice, however, about 1.6 lb. of hydrochloric acid is required to leach 1 lb. of manganese because of other soluble constituents in the ore.

After the leach was completed, the residue was separated by filtration on a plate-and-frame filter press.

SOLUTION PURIFICATION

After the manganese had been leached from the calcine and the residue separated from the solution, impurities such as Co, As, Ni, Cu, Fe, Pb, and possibly others had to be removed before the solution was suitable for electrolysis. The purification procedure depended on the impurities in the solution. However, it was found that all harmful impurities could be removed by the addition of a sulphide ion. In the pilot plant, hydrogen sulphide was used, as it was easily added and was the most economical form of sulphide ion. Other sulphides, such as barium, sodium, and ammonium, also are satisfactory.

The leach filtrate was purified in 500 gallon batches in a wooden tank. The solution was circulated by a pump and hydrogen sulphide added until the impurities were precipitated. The solution must not be aerated during purification; therefore, mechanical agitation was not employed. Sulphide consumption by this batch method was high—about 1 gramme per litre of solution. If carried out on a continuous basis, as described by J. H. Jacobs, "The Effect of Cell Variables on the Electro-winning of Manganese," *Trans. Electrochem. Soc.*, vol. 90, 1946, p. 211, in the sulphate process plant, the hydrogen sulphide requirement would be about 0.2 gramme per litre if lead was removed previously as the sulphate. If lead was removed as the sulphide, the hydrogen sulphide consumption would be correspondingly higher. The presence of slimes also increases sulphide consumption; consequently, the leach-solution filtrate or thickener overflow should be as clear as possible.

After the impurities had been precipitated, the solution was filtered on a plate-and-frame filter press. A typical analysis of solutions before and after purification is given below.

Results of Purification of Solution by Hydrogen Sulphide

Constituent	Grammes per litre	
	Solution before purification	Solution after purification
Mn	60.7	60.3
Fe	0.03	0.0002
Cu	0.65	0.0001
Pb	1.47	0.0004
As	0.00004	0.00004
Mo	0.001	0.0002
Ni	0.011	0.0006

After the metallic impurities had been removed by precipitation as sulphides, the solution still contained colloidal sulphur and sulphides, which had to be removed before electrolysis. This was done by aeration and filtering after adding 0.1 gramme iron per litre as ferric chloride. The iron precipitated as the hydroxide and acted as a collector for the sulphur and sulphides. Addition of the iron was not absolutely necessary, but its use insured a pure solution.

Sulphur removal and iron purification were carried out in 500 gallon batches in an agitated wood tank. About 1 hour was required for complete precipitation of the iron, and 0.5 to 1.0 gramme manganese per litre also was precipitated. The solution was clarified by filtration on a plate-and-frame filter press. After filtration the solution was pure and ready for electrolysis.

REVIEWS

Colliery Lubrication

With the increasing mechanization of mining, which has gone forward at an accelerated rate under the aegis of the National Coal Board, both miners and mining officials now find themselves confronted with more and more machinery for the faster and more efficient winning of coal, which has to be lubricated with the right type of lubricant in order to give the best service.

Colliery Lubrication, the latest addition to the range of most useful illustrated technical publications issued by C. C. Wakefield & Co., Ltd., 46, Grosvenor Street, London, W.1, the well-known firm of lubricating specialists, will, therefore, be warmly welcomed.

An introductory chapter entitled "Why so Many Grades of Lubricant?" is followed by chapters devoted to lubrication problems connected with *inter alia*, Winding Machinery, Electricity in the Mine, Compressed Air and Compressed Air Tools, Hydraulic Equipment, Coal Cutters, Loaders, Conveyors, the Diesel Mine Locomotive and the Steam Locomotive. The two concluding chapters, entitled respectively Coal Washing and Preparation Plant and Storage and Issue of Lubricants, are followed by a list of Wakefield recommended grades. A complimentary copy of this interesting publication may be obtained upon application to the above-mentioned address.

The Stock Exchange Official Year Book, 1951, Vol. II.

—Thomas Skinner & Co. (Publishers) Ltd., Gresham House, Old Broad Street, E.C.2. Price for the two annual volumes, £6 net; by post (inland) £6 2s. 6d., and

Register of Defunct and Other Companies, 1951.—

Thomas Skinner & Co. (Publishers) Ltd. Price £1 net.

Volume II of the *Stock Exchange Official Year Book*, just published, is the second half of the 1951 issue of this standard reference work. Volume I, of which a few copies are still available, contains the larger number of sections, including *inter alia*, all Government securities, Railways, Banks, Breweries, Insurance, Iron and Steel, Oil, Rubber, Shipping, Tea, Telegraph, Telephone, Tramway and several others, while Volume II embraces the important section entitled "Commercial, Industrial, etc.," as well as Financial Trusts, Land and Property, Investment Trusts and Mines.

The entire work was split into two volumes at the beginning of 1949 for general convenience, and the two volumes, which total 3,720 editorial pages, are about equally divided in size.

The work of bringing Volume II up to date has been quite as heavy as usual and the number of new companies introduced exceeds 100. No less than 95 new companies appear in the Commercial, Industrial, etc., section. The two volumes are indeed the indispensable guide to government and joint stock finance. They are under constant revision and improvements and extensions are made year by year. The most important new features this year is the introduction, into Volume II, of a combined index of both volumes; the folios of the two volumes being distinguished by heavy and light type.

The *Register of Defunct and Other Companies*, which makes its appearance with Volume II of *The Stock Exchange Official Year Book*, is steadily increasing in size. The nationalization of the gas industry affects over 600 gas undertakings whose securities have been, or are being exchanged for British Gas stock in amounts which are here recorded. Several additions have been made in the past year. This record of "defunct" securities is a valuable time-saver for all who are engaged in dealing with deceased estates, especially solicitors and executors.

Machinery & Equipment

Main Electric Drives and Control Gear for the World's Largest Walking Dragline.

The British Thomson-Houston Company designed and manufactured the main electrical equipment for the new walking dragline which has recently been put into operation at the Corby ironstone workings of Stewarts and Lloyds, Ltd., details of which were given in our issue of November 9. This comprises a complete Ward-Leonard control scheme, totalling over 3,000 h.p. and incorporates amplydne control for the first time on any excavator built in this country.

The following is a short description of the electrical equipment, designed especially by B.T.H. for this unique machine: Power is supplied through two flexible trailing cables at 6,600 volts via air-insulated collector gear into the main superstructure. From here it is fed into two main switching cubicles where it divides through independent isolating switches to supply the main motor-generator sets, a 200 kVA, 3 phase, 6,600/440 volt auxiliary transformer, and a 50 kVA, 3 phase, 6,600/110 volt lighting transformer.

There are two duplicate main motor-generator sets in the dragline, resiliently mounted right across the tail end of the main structure. Each set is driven by a 1,200 kVA unity power factor, 1,000 r.p.m. synchronous motor and consists of a 400 kW, 550 volt hoist generator, a 400 kW, 550 volt, drag/walk generator, and a 200 kW, 275 volt swing generator.

Two identical motor-driven exciter sets are installed, one of which is maintained as a standby. Each set has a 95 h.p. induction motor, driving a 56 kW, 125 volt, constant-voltage exciter for supplying the D.C. motors and generators and a 17 kW, 45 volt machine for supplying the synchronous motors. An amplydne is also included to control the field of the synchronous-motor exciter, so as to keep the power factor of the main synchronous motors at any desired value from unity to 0.8 leading—irrespective of load variations on the main motor-generator sets. A separate motor-driven amplydne generator set is provided for the control of the hoist, swing, and drag/walk generators.

The hoist, drag, and walk motors are each driven by four 225 h.p., 230 volt, 450 r.p.m. separately-excited, shunt-wound, heavy duty motors. These motors operate in tandem and are connected in pairs, in series, across each of the hoist and drag/walk generators.

Two 225 h.p. motors supplied one from each swing generator drive the slewing motion. The motors are vertically mounted on top of their respective gearboxes, but, electrically, they are of the same design as the hoist, drag and walk motors.

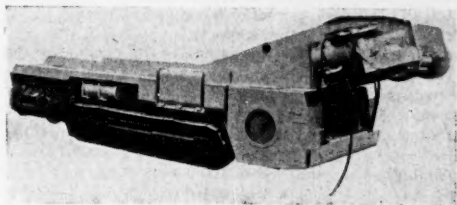
The whole machine is controlled by one man from either one of two control cabins situated on either side of the superstructure at the front, and level with the bottom of the boom. Each cabin houses an almost identical control console. Three cam-operated master controllers are situated behind the seat of the console and are operated by a link mechanism from the two vertical levers for the hoist and drag/walk motions and from the pedals for the swing motion. Along the right-hand arm of the console are the three pistol-grip two-position switches for the brakes on the various motions and another similar switch for changing over from drag to walk; indicator lamps suitably inscribed show when the motor-operated changeover switch had actually completed its travel and changed over the supply to the motors required. Tumbler switches are also incorporated to control the various floodlighting circuits (through contactors where necessary) to enable the machine to work at night.

New Crawler-Type Shuttle Car for Mines

A new cable-reel crawler-type steel-track shuttle car for mine application has been announced by the Locomotive and Car Equipment Department of the (U.S.) General Electric Company. The new unit, designed for operation in close quarters, has a turning radius of from 14 to 16 ft. Unlike previous shuttle-car designs using rubber-tired wheels, the new unit—which is illustrated below—provides for light ground-loading pressure per sq. in. by distributing weight over a large ground area.

Because no clearance is required for turning wheels, a much wider conveyor is built into the body of the track-laying car for the same overall width. Improved maneuverability is illustrated by the track-laying shuttle car's ability to turn by locking one track completely. Because of a wider conveyor, unloading speed is increased. Simplicity is stressed by the use of only two drive motors, one on each track, eliminating complicated gears, drive shafts and steering mechanisms required by the conventional four-wheel drive, four-wheel-steer shuttle car.

This new 250 volt car is driven by two-sealed type, 20 h.p., 250 volt series-wound motors, driving each track through single gear reduction, chain and sprocket. The gear case is an integral part of the motor. One sealed-type, 3 h.p., 250 volt compound-wound pump motor drives hydraulic auxiliaries. The conveyor chain is driven by two 5 h.p., 1,750 r.p.m. compound-wound gear motors, with a 44-1 gear ratio.



The (U.S.) General Electric Company's new 6 ton shuttle car, Type TIE-6-A1 showing lifting front

The cable reel is hydraulically driven with sealed-type enclosure. A spooling device controls level winding. The reel is equipped with 600 ft. of No. 3 two-conductor cable with ground wire and guides permit reeling in either direction. The hydraulic motor torque is automatically compensated for reeling and unreeling cable pull.

Two steering levers at the operator's position operate the tracks. They are connected to the traction motor power circuits and to hydraulic brake valves. By moving a steering lever forward a few degrees, the corresponding traction motor is disconnected from the line, and the car turns slightly. Hydraulic pressure is applied to the steering brake by advancing the steering lever farther. For a very sharp turn, one track can be locked.

The track carriage is hinged to the body at the track drive end. The carriage is flexibly connected to the body on the front end by means of a torsion spring. The front main idler is positioned by a track recoil spring to absorb shock and maintain proper track tension.

The track linkage consists of forged hardened steel side-links with hardened steel pins and bushings. The track shoes are of hardened wear-resistant steel, smooth on the bottom, each track is running on six rollers and is supported over the top of the track carriage by two idler rollers.

Metals, Minerals and Alloys

The C.I.O. United Steel Workers held a three-day meeting in Atlantic City last week and adopted the set of demands to be presented to the American steel industry next month, but the details so far have not reached us. The head of the C.I.O., Mr. Philip Murray, said he hoped an agreement could be reached on their demands without interference from the Government. This observation seems to suggest that, as has happened before, in the last instance the Government is expected to enforce terms on the industrialists which would prevent a strike and consequent nation-wide, and indeed international, disturbance which would result.

A supplementary vote for £47,966,470 for the Ministry of Materials was agreed to in the House of Commons on Wednesday. Of this amount £18,750,000 is for non-ferrous materials of which £17,500,000 is allocated to stockpiling and the balance due to higher prices. In detail the figures cover £9,500,000 for lead, £4,500,000 for zinc and £4,000,000 for copper. Mr. Churchill stated that he was not proposing to make any immediate change in the working of the Ministry of Materials or to appoint a new Minister.

Copper.—The copper scarcity in the U.S. is underlined by an N.P.A. order that makers of less essential goods should restrict their use of the metal to 10 per cent of the base period before the Korean war. The Ministry of Supply has issued a further order restricting the use of copper in various domestic products.

The Copper Institute's figures of production in the U.S. showed considerable recovery during October, crude rising to 87,824 s.tons (74,165 in September). Refined output totalled 104,148 s.tons (74,354). Deliveries at 125,286 s.tons were the highest for the year. Stocks of refined increased by 16,000 s.tons to 78,192 s.tons at the end of the month. Outside the U.S. production of primary metal was 122,840 s.tons (112,851), and of refined, 115,825 s.tons (101,133). Deliveries to manufacturers were 89,495 s.tons (74,131) and stocks at the end of the month 170,477 s.tons (163,538) at end of September.

French buying policy is changing as a result of the shortage and grey market prices are now being paid by the G.I.R.M. which recently bought large quantities of Mexican metal at premium prices. One large firm reported paying frs. 490 per kilo against the current price of frs. 280. Private firms can of course import copper at any price so long as the copper content of the manufactured article is priced at the controlled figure.

Italian imports of copper in the first nine months fell below those of last year at 52,479 tonnes against 57,706 tonnes; scrap imports also were lower. The Ministry for Foreign Trade has authorized an import quota of 2,500 tonnes of blister from Chile for the production of copper-sulphate.

The R.F.C. has approved a loan of \$57,000,000 for the Copper Range Company which will be used to develop the White Pine project in Ontonagon County, Michigan.

The first shipment has been made from Germany to the U.S. of a new copper-aluminium compound bearing the name of "alcup." It is produced by cladding aluminium with electrolytic copper. At present only inventory samples have been dispatched. It is hoped that supplies approximating \$6,000,000 will be forthcoming in the course of a year.

Lead.—Supplies of lead in the U.S. remain critically scarce. Lead allocations in November were 28,000 s.tons with supplies only about 23,000 tons. Domestic mine pro-

duction is expected to be below last year's output of 430,000 s.tons, and the scrap supply continues to tighten. The N.P.A. in its arrangement with the Canadian Government to advance the ceiling price of imported lead to 19c. per lb. indicated that it was feeling its way towards international price stabilization.

President Truman has approved the sale to industry of 30,000 s.tons of lead from the military stockpile. The metal will be transferred to the G.S.A. who will sell it to consumers as allocated by the N.P.A. As usual the lead is expressed to be returnable.

It is reported from Yugoslavia that shafts are being sunk on old Roman mines at Bratinac in E. Bosnia and across the Drina in Serbia. Lead will be the chief product but there should also be zinc, silver and cadmium.

It has been suggested in America that there have been large shipments of lead from Western Europe to Iron Curtain countries, particularly Poland and Czechoslovakia and that this has been partly responsible for the fall in U.S. imports. However the West German Economics Ministry replied that after careful examination it had been shown that lead exports this year went only to western countries.

French consumption this year is estimated at 80,000 tonnes which should be met. German domestic supplies are reported sufficient at present but supplies of concentrates may become uncomfortably tight next year.

Mexican exports have of late been good to countries other than the U.S. and the fixing of export prices has been deferred. European buyers have paid as high as 22c. f.a.s. Gulf ports.

Tin.—The American Tin Mission in the East left Singapore at the beginning of the week after inspecting all types of mines and the Penang and Singapore smelters. General Wilson is reported as saying that the mission had been successful in many respects and that they would submit a report to the U.S. Government as soon as possible. Their visit has coincided with the worst week, so far experienced, of bandit action.

According to a Reuter report from Singapore, Chinese miners are prospecting for tin on several rubber estates and are believed to have paid up to \$5,250 per acre for estates "containing rich tin ores." Work, on some portions at any rate of the rubber estates, has ceased owing to the bandits and it is possibly to such cases that the report refers. Whether the Malay Government will grant mining title for rubber land remains to be seen.

The U.S. Government's decision to cease stockpiling tin and cut back consumption has been sharply criticized by the *American Metal Market* which contends that the D.P.A. has constituted itself a bulk-buying instrument of national supplies, after the fashion of the late Labour Government in this country, and asserts that Congress never intended that a strategic stockpile should be used as a weapon to establish an arbitrarily determined price and argues that with the termination of buying by the Government, controls should similarly be ended. Possibly as a result of such criticism the D.P.A. has stated that it is reversing its previous decision on a cut back and will make available for tin plate production in the first quarter of next year 7,500 tons instead of the earlier allocation of 5,000/6,000 tons; the amount now provided falls little short of what the industry had asked for. Mr. Fleischmann, head of the D.P.A., has suggested the exchange of U.S. steel against British tin and possibly other metals. A final decision on this move should, he said, be made in the current week.

The Malay States output in October was 4,873 tons compared with 4,645 tons in September. The total for the ten months is 47,363 compared with 48,142 for the same period last year showing a decline of 779 tons.

Concentrates imported into the Straits from other sources in October were 916 tons: Thailand 601, Burma 299, Indo-China 16 tons.

Bolivian concentrates continue to find their market in Europe on an increased scale. U.K. imports in October amounted to 4,359 tons, bringing the total U.K. imports in the month to 5,458 tons.

Bolivian producers are reported to have resumed their agitation for 150c. price on U.S. sales and are now urging the re-establishment of a free market within the dollar tin price ceiling, which hardly seems consistent.

Nigeria landed 1,072 tons more in October making a ten months' total of 9,780 tons against 9,139 tons a year ago.

In the U.S. tin plate trade shipments fell off in September to 451,340 s.tons against 519,820 s.tons in August. For the completed nine months shipments were 4,156,130 s.tons against 3,979,304 in the same period of 1950 but whereas hot dip plate fell from 1,438,246 to 1,270,145 s.tons shipments of electrolytic plate were practically the same at 2,145,843 s.tons against 2,149,674. Hot dipped plate of course must be the chief sufferer from a curtailment of tin supplies to industry.

Zinc.—U.S. advices are that supplies seem adequate for the restricted usage requirements. The O.P.S. is understood to have formulated specific ceilings on primary zinc which will apply to all sellers, both in the regular market and outside. These, if issued, will wash out all higher ceilings previously legalized and establish a flat figure of 19.5c. E. St. Louis for Prime Western. At the annual meeting of the American Zinc Institute earlier in the year the London price was criticised as a political decision by a foreign government and not an economic price. Mr. W. E. Taylor, of the Ministry of Supply, demurred to the suggestion that it was a political price and explained that the purchases might vary between 17½c. and 25c. and the sale price was averaged so as to avoid losses. Mr. S. D. Strauss (A.S. & R.) referred to the existence of a large accumulation over several years of zinc concentrates in Australia which if it could be moved would ease the situation everywhere.

The U.K.'s zinc imports in October were 11,686 tons (11,222 in September). Supplies were derived from Canada, U.S., and Belgium. Imports of concentrates were 11,080 tons, principally from Australia.

A big increase in the production of zinc is being made in French Colonial Empire. French Morocco is expected to turn out 80,400 tonnes next year, Algeria 16,200, French Equatorial Africa 8,000 and Tunis a like amount. In France itself reduction capacity is to be raised to 100,000 tonnes next year, which with imports should suffice for domestic requirements of 110,000/120,000 tonnes annually.

Aluminium.—Aluminium, like copper, is now extremely scarce in the U.S. but unlike it, it is capable of great expansion. However the D.P.A. has not yet decided on measures in this direction beyond those already authorised, and consequently possible conversion orders to industry from copper to aluminium are still in abeyance. What is described as "a well-known British aluminium works" has reached agreement with the Newfoundland Government to develop an aluminium plant there. Highly favourable reports have appeared in India of discoveries of bauxite in the Surguja district of Madhya Pradesh (C.P.). The deposits are said to extend over 100 miles with reserves estimated at 8,000,000 tons. Prospecting is being carried out also in Bilaspur district of the same State.

The Norwegian aluminium output, which is now rated at about 48,500 tonnes per year, is set for a big increase. There are now three producing concerns; the State-owned A/S. Ardall & Sundals Verk (25,000 tonnes); Det Norske Nitridaktieselskap at Tyssendal and Eidehavn (15,000 tonnes); and the A/S Norsk Aluminium Co. (8,500

tonnes). Det Norske Nitridaktieselskap is jointly owned by British Aluminium, Alcan, and Pechiney. The new Sundalsora plant, now under construction, should start production in early 1954 with an output of around 20,000 tonnes, rising to 40,000 tonnes a year later with further extensions possible thereafter up to 75,000 tonnes.

The Austrian Lend Works in Salzburg has started a new smelting unit as, unlike Ranshofen, it possesses its own power supply. Austrian output to end of August this year was 21,124 tonnes (13,399 a year ago).

Brazil's first aluminium works operated by Electro-química Brasileira, associated with Alcan, went into commission in October. It has a capacity of 2,000 tonnes. A second plant is now planned by the Cia. Brasileira de Alumínio. This is to be cited in São Paulo with an initial capacity of 7,000 tonnes. Brazilian imports at present are said to average about 10,000 tonnes yearly. Anaconda proposes to arrange for the construction of a plant at Katsispell, Montana, with a capacity of 54,000 tons.

Antimony.—The price for domestic antimony was raised in the U.S. from Wednesday last to 50c. per lb. as against 42c. previously, for +99 per cent grade. When they raised their price O.P.S. said that there was a serious shortage in the country and that world prices had risen up to 60c. per lb.

Asbestos.—Asbestos of Philadelphia reports that there is now a fair supply of long qualities, but the lower grades of the mineral are still short. No change is looked for in the market for the next year. Asbestos cloth is in heavy demand and all other asbestos textiles exhibit a very strong market. In brake linings sales though still high appear to be dropping in some spots. Business in asbestos paper is now back to normal volume; millboard has slowed up. The market for high pressure installation goods is very active; in low pressure materials the volume is expected to be maintained next year though business may perhaps prove spotty. There is a fairly strong market for siding and roof shingles; flat sheets and corrugated asbestos for cement roofing are strong, as is the demand for pressure pipe and electrical conduit. For tiles the market continues strong with the outlook for next year good.

An occurrence of high-grade asbestos has been uncovered over 100 ft. in a drift on the Newfoundland Asbestov Limited's ground near the west coast of the island. The asbestos zone is said to measure more than 15 ft. across and the company has received a loan from the Government.

Cobalt.—It is planned to increase the production of cobalt in Morocco to 7,000 tonnes next year as compared with 3,500 tonnes in the current twelve months.

Magnesium.—At the annual meeting of the Magnesium Association in New York last week a very optimistic tone prevailed and the future is regarded as brighter than it has ever been. Shipments are reported to have doubled in the last year running currently about 4,000 s.tons a month. Besides older producers like Dow Chemical Co., Alcoa has now entered the field and is already producing 175 tons monthly.

Manganese.—A big expansion in manganese production has been achieved in Morocco where in 1950 257,775 tonnes of metallurgical and 29,491 tonnes of chemical ores were produced. This year the output is expected to reach +300,000 tonnes and may later be increased to 400,000.

Quicksilver.—The U.S. domestic price has been reduced to \$216/\$219 per flask, but traders regard this price as still too high.

Sulphur.—The question of reserves of sulphur ore in the Sicilian mines is beginning to cause some anxiety in view of the present intense world demand being estimated at not much over four years' supply and it is doubtful whether the E.C.A. schemes will be effective under several years. U.K. imports in October were 38,349 tons—ten months 346,674.

Tungsten.—Generally speaking market conditions here remain unchanged since our last report. There appears however to be a little easing in prices at which overseas producers are prepared to do business, and we should call the price 505/520s. per s.ton. unit.

Gold.—The Transvaal output in October, which was a long month, was 977,652 f.oz. compared with 951,980 in September. A year ago the output was 966,661 f.oz. The U.S. output is running somewhat below last year's figures. Production for the first eight months was 1,325,730 f.oz.

The London Metal Market

(From Our Metal Exchange Correspondent)

The American scene has completely occupied the stage this week as the position there becomes more critical. It has been announced that the R.F.C. stock of industrial tin contains only 7,500 tons of grade "A" metal and this tonnage has now been allotted to the tinplate makers for the first quarter of 1952. At the same time it is understood in London that the output of the Texas Smelter is diminishing owing to difficulties in the raw material supply position. It has also been officially announced that tin now under delivery for the stockpile will not be diverted into industry. This announcement was in accordance with the expectations of those people who maintain that releases from the stockpile are unlikely to be authorized by the President as this would lay him open to the charge of using the American stockpile in an attempt to influence world prices, and this is a point which was excluded from the original Stockpile Act. The releases of copper, zinc and lead are in an entirely different category as here the tonnages are required for strategic industry at a time when the metals are in short supply throughout the world, and therefore no question of price manipulation comes into question, and in addition the metal is expected to be replaced eventually out of U.S. production.

It looks as if the time has almost come when the policy supported by Mr. Symington will be proved a failure and it is hoped that he will retire gracefully from the scene, and return the tin trade to those private firms who have been engaged in it for so long and who are quite capable of supplying their country's needs even if they have to submit to certain broad Government directives.

On Thursday the official close on the tin market was: Settlement price £1,000, Cash Buyers £1,000, Sellers £1,005; Three months' Buyers £965, Sellers £967 10s. In the afternoon the market was steady. Turnover for the day was 180 tons. Approximate turnover for the week was 815 tons.

The Eastern price on Thursday morning was equivalent to £968 12s. 6d. per ton, c.i.f. Europe.

Iron and Steel

The quest for iron and steel is becoming frantic. The Iron & Steel Corporation is exercising constant pressure to secure supplementary tonnages from U.S.A. and bigger quantities of steel semis from the Continent. At home reduced deliveries have been the cause of disturbing industrial repercussions. The motor car industry is falling behind with its production schedule, the National Coal Board is stated to be losing coal output because of the steel shortage and in many other industrial establishments, time and production is being lost for the same reason.

There is no doubt that the steel makers are falling heavily into arrears with their deliveries. It is of course the inevitable consequence of shrunken outputs. In the first half of the year over 8,000,000 ingot tons were produced and the 16,000,000 tons target for the year seemed to be attainable. Now it is improbable that the year's output will exceed 15,500,000 tons which represents a drop of about 800,000 tons and this at a time when normal requirements have been swollen by the re-armament programme.

Prices, already at their highest altitude, are still exposed to inflationary pressure. The miners' wage claim threaten a further rise in coal prices, and the Railway Executive has already asked for increased freight rates to offset the rise in railwaymen's wages. A corresponding advance in steel prices would almost certainly have to be imposed.

On Monday last the Minister of Supply issued an order increasing the basic price of spiegeleisen from £18 15s. 9d. to £22 per ton. But at the moment prices are a secondary consideration. Works executives would willingly pay more for urgently needed material. Hence the widely circulated stories—possibly exaggerated—of a black market in steel.

Urgent as is the need, expansion of steel production is not yet in sight. Scarcity of coal and scrap are still the chief restraining influences. The reported decision of the American steel interests to waive their claim to a share in German scrap exports in favour of the U.K. is little more than a gesture, since the flow of scrap from Germany has almost dried up. However, the current month's allocation of German scrap shipments to British ports has been fixed at 20,000 tons and more distant sources of scrap supply are being explored.

In the meantime ingot production is insufficient to keep the rolling mills fully employed and some of the mills are now only working 14 shifts a week instead of a normal 16 or 17. Pig iron is also in short supply and stocks are dangerously low.

NOVEMBER 22 PRICES

COPPER

Electrolytic... .. £227 0 0 d/d

TIN

(See our London Metal Exchange report for Thursday's prices)

LEAD

Soft foreign, duty paid £175 0 0 d/d

Soft empire, including secondary lead £175 0 0 d/d

English lead £176 10 0 d/d

ZINC

G.O.B. spelter, foreign, duty paid £190 0 0 d/d

G.O.B. spelter, domestic £190 0 0 d/d

Electrolytic and refined zinc £194 0 0 d/d

ANTIMONY

English (99%) delivered, 10 cwt. and over £365 per ton

Crude (70%) £290 per ton

NICKEL

99.5% (home trade)... .. £454 per ton

OTHER METALS

Aluminium, £124 per ton. Platinum (scrap), £33.

Bismuth, 28s. lb. Platinum, £27/£33 5s. nom.

Cadmium, 18s. 9d. lb. Rhodium, £45 oz.

Chromium, 6s. 3d. lb. Ruthenium, £30 oz.

Cobalt, 17s. 6d. lb. Quicksilver, £73 10s./£74

Gold, 248s. f.o.z. ex-warehouse.

Iridium, £65 oz. nom. Selenium, 25s. nom. per lb.

Magnesium, 1s. 6d. - 2s. lb. Silver (bar), 77d. f.o.z. spot

according to quantity. and forward.

Osmiridium, £35 oz. nom. Tellurium, 19s. lb.

Osmium, £70 oz. nom.

Palladium, £8 10s. oz.

ORES, ALLOYS, ETC.

Bismuth 40% 14s. 9d. lb. c.i.f.

30% 12s. 9d. lb. c.i.f.

Chrome Ore—

Rhodesian Metallurgical (lumpy) £13 per ton c.i.f.

" (concentrates) £13 per ton c.i.f.

" Refractory £12 12s. per ton c.i.f.

Baluchistan Metallurgical ... £13 18s. 6d. per ton c.i.f.

Magnesite, ground calcined ... £26 - £27 d/d

Magnesite, Raw ... £10 - £11 d/d

Manganese, Best Indian (Nominal)

Molybdenite (85% basis) ... 103s. 14d. per unit c.i.f.

Wolfram (65%), U.K. ... 505/520s. nom. c.i.f.

Tungsten Metal Powder ... 35s. nom. per lb. (home)

(for steel manufacture)

Ferro-tungsten ... 33s. nom. per lb. (home)

Carbide, 4-cwt. lots ... £30 3s. 9d. d/d per ton

Ferro-manganese, home ... £40 12s. 8d. per ton

Ferro-manganese, export ... Nom.

Brass Wire ... 2s. 7½d. per lb. basis.

Brass Tubes, solid drawn ... 2s. 1d. per lb. basis.

The Mining Markets

(From Our Metal Exchange Correspondent)

Although markets this week continued their downward progress, a definitely steadier tendency became apparent towards the end of the period. Among gilt-edged securities, it is noteworthy that another long dated security cut the 4 per cent yield level this week. This was British Transport 3 per cent Guaranteed Stock 1978/88 which, at one time, touched 82 per cent. British Gas 3 per cent 1990/95 have of course been on this basis for some time their price being only a fraction better than 80 per cent. "Undated" issues such as War Loan 3½ per cent and 4 per cent Consols now yield around 4½ per cent. It is hoped that prices may hold this level at any rate for the time being.

Almost all sections of the mining market moved downwards in sympathy. The general uncertainty caused buyers to hold off, and a few selling orders led jobbers, already satiated with stock, to mark down prices. Here again a rather better tone predominated on Wednesday and some lost ground was recovered.

Commodity shares suffered the worst. Lead/zinc issues came back in spite of continued satisfactory demand for the metal. Coppers, where the statistical position is considered to be unusually strong for the foreseeable future, followed suit. City circles think that this may well be a sign that peak prices have been passed. This does not necessarily mean that we are in for a full scale bear market, but simply that we may not again see prices at their inflated pre-election levels.

Technically speaking, a fall in industrials, commodities, etc., should benefit gold shares, but here the situation is somewhat confused. The world prices of foodstuffs have not fallen and consequently the basic cost of living has not so far decreased. The current high cost of mining, in which equipment and wages play major parts, causes consider-

able anxiety, and undoubtedly exercises a check on the prices of many leading gold shares. Any positive signal that working costs of gold mines had reached their peak and were beginning to decline could bring about an overnight change in the Kaffir market.

It was announced at the annual meeting of Doornfontein that crushing is expected to begin early in 1953. A statement by Strathmore Consolidated Investments announced the forthcoming flotation of a new mine in the Klerksdorp district. This will be called the Ellaton Gold Mining Co. The company's property will embrace an area on two farms Strathmore 15 and Nootgedacht 53. A feature is the shallow depth, between 270 ft. and 1,724 ft. at which reef has been encountered. This should, therefore, be a low cost mine to bring into production.

In the O.F.S. the New Consolidated Free State borehole on farm Saasplaas 690 was disappointing. Values of only 5 and 6 in.-dwt. have so far been encountered. A further deflection is in progress. Following a report that an explosion in the Welkom mine had killed five natives, the shares eased. A winding accident at Loraine is reported to have caused the death of eight natives. Virginia No. 1 shaft is now 567 ft. and No. 2 shaft 291 ft. above the reef horizon. Merriespruit No. 1 shaft is down to 2,300 ft.

West African shares remained quiet and dull. Jobbers in the market reported no interest. The Gold Coast Selection Trust quarterlies record lower profits, but in most cases developments appear satisfactory. Amalgamated Bantek report substantial capital and development expenditure, and good progress is being made on the Fanti ropeway. Bremang Gold had one of its dredges out of action for 72 days during repairs, but nevertheless records a quarter's profit of £60,911. The new dredge paddock on the Offin River is 80 per cent complete. Several good developments are reported from Gold Coast Main reef, and Ariston have expanded considerable sums on development and capital accounts.

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Rand and O.F.S. September Quarterlies

The chief broad interest in the September quarterly reports of the Rand gold producers resided in the amount of revenue received from the sale of gold at premium prices. In the aggregate it was much less than in either of the two previous quarters. Although with certain mines the drop was not very substantial, it was accompanied by a general rise in working costs; hence profits were squeezed except where the milling rate was raised.

According to the Transvaal Chamber of Mines, additional revenue accruing to the mines from sales of gold for industrial and artistic purposes for the three months ended September 30, totalled £1,636,388 against £1,929,894 in the second quarter of this year and £1,937,977 for the March three months. It is still too early to postulate on the future price of gold in the free market in the light of I.M.F. premium sales modification announced on September 28.

A point which emerges from examination of the figures of the various Rand mines is the wide difference in the premium sales as percentage of the total revenue. Blyvoor's premium sales, for instance, last quarter amounted to 6 per cent, but they were as high as 25 per cent with Con. Main Reef, 18 per cent with Libanon and up to 29 per cent with Simmer & Jack. In the case of certain producers—New Modder, Robinson Deep, New State Areas and Wit Gold, income from premium sales amounted to more than the working profit for the quarter.

CENTRAL MINING—RAND MINES GROUP

Focus of interest in the Central Mining group was particularly directed to developments of Blyvoor, City Deep and East Rand Proprietary. Rather less footage was accomplished by Blyvoor and of the 4,060 ft. sampled (against 5,075 ft.), pay percentage was slightly down at 94 against 100 in the previous quarter and 97 in the March three months; the value was 580 in.-dwt. compared with 620 in.-dwt.

City Deep reported that the exposures on the Main reef and South reef were nearly all in the upper levels of the mine where extensive prospecting work is being undertaken with the object of opening up old areas on the Leader reef. 23 per cent (against 30 per cent) of the 7,090 ft. sampled proved payable at 302 in.-dwt.

Average values from development at the East Rand Props. were more normal at 398 in.-dwt. compared with the exceptionally high figure of 616 in.-dwt. in the preceding three months. Payability last quarter was, however, particularly good, being 76 per cent, well above the average of recent years, and comparing with 66 per cent in the June quarter.

There was a drop in Crown Mines pay ratio—49 per cent against 57, value being 238 in.-dwt. compared with 275. Durban Deep also announced a slightly lower pay percentage—56 against 58—but the value of 338 in.-dwt. was better. Remarkable consistency characterized Consolidated Main Reef's results; slightly more development was done and of the 8,630 ft. sampled, pay percentage and value were exactly the same as in the June quarter—52 per cent and 206 in.-dwt.

Payability of the 3,470 ft. sampled on Modder East was poor—10 per cent against 14, but value was slightly better, 186 in.-dwt. Improvement was shown by Rose Deep in the sampling of 7,410 ft. for a pay ratio of 40 per cent (against 32) and a value of 346 in.-dwt. (281). Both on New Modder and Welgedacht the average values from development showed up better.

ANGLO AMERICAN CORPORATION

Development results for the mines of the Anglo American group, although varying a great deal last quarter, were up to those of the previous three months.

Daggafontein opened up a larger footage on both the Main reef leader and the Kimberley reef; the value of the 8,650 ft. sampled on this latter being 374 in.-dwt. as against 354 in the June quarter, although the pay ratio was slightly down. That of the Main reef leader was up at 51 per cent, value being 237 in.-dwt. Work on the two similar reefs of East Daggafontein varied; the pay percentage of the 5,455 ft. opened up on Kimberley was only 21 (against 37 in the previous quarter); the in.-dwt. being 296 compared with 360. The slightly larger footage sampled by South African Lands—14,730 ft. gave a pay ratio of 41 per cent and a value of 361 in.-dwt. With this mine, the advance in working profit which has been shown every quarter since devaluation in 1949 was again evident in the September three months.

Less work was done on the old Brakpan and of the 13,895 ft. sampled, 23 per cent (27) proved payable, value being 442 in.-dwt. against 497. The companion Springs Mines opened up 1,804 ft. on the Kimberley reef and of the 1,715 ft. sampled, 13 per cent (against 9 per cent) proved payable; the value of 299 in.-dwt. compared with 262 in.-dwt.

"Anglos" mines situated in the Klerksdorp area—Western Reefs and Vaal Reefs—have reached another milestone on the road to production; they have completed the sinking of their No. 3 shaft, and development should soon give results. Western Reef's capital expenditure was stepped up to the point where it exceeded the increased taxed profits. Rather more footage was accomplished and of the 10,050 ft. sampled, 40 per cent (49) was payable, the in.-dwt. figure being 404 against 457. The company announced continued prospecting work outside the mining lease area on farm Goedgenoeg.

CONSOLIDATED GOLD FIELDS

Most of the producers under the aegis of the Gold Fields accomplished more development; footage sampled varied as likewise the pay ratio with the exception of Vlakfontein where payability of 32 per cent of the 8,830 ft. sampled was the same as in the preceding quarter; value was higher at 409 in.-dwt. against 354. Libanon's footage sampled on the Main reef, 6,780, gave a pay ratio of 65 per cent against 59 and value of 301 compared with 307 in.-dwt. An increase in payability from 60 to 67 per cent was secured by Luipaards Vlei; average values were 333 in.-dwt. against 280. Increased development footage was accomplished by Venterspost but the pay ratio of the 7,030 ft. sampled fell back to 65 per cent against 73 and the value to 345 in.-dwt. compared with 354.

A substantially larger footage was sampled by Simmer & Jack (8,390 ft. against 6,630 ft.) of which 44 per cent proved payable, giving a value of 296 in.-dwt. against 241. Robinson Deep's average value was also better (351 against 308 in.-dwt.), though the pay ratio of 56 per cent went against 60 per cent.

Of the Far Eastern producers, Sub Nigel sampled 10,300 ft.; the pay ratio being 33 per cent and value 372 in.-dwt. against 430 in.-dwt. Although Vogelstruisbult did rather less development and sampled less (8,785 ft. against 9,885 ft.), the pay ratio rose to 52 (against 49) per cent and value to 276 compared with 254 in.-dwt.

A total of 4,780 ft. of development was done by West Driefontein on the 10th, 11th and 12th levels. Development on Carbon leader was continued and 2,840 ft. were sampled; all proved payable at an average value of 13.1 dwt. over an estimated width of 45 in., equivalent to 590 in.-dwt. Doornfontein reported that preliminary work in connection with the erection of the reduction plant was

commenced during the quarter. The Annan shaft was sunk to a final depth of 4,736 ft. and the No. 1 shaft reached a depth of 1,237 ft.

UNION CORPORATION

The most noteworthy detail in the Union Corporation quarterlies was the improvement in Van Dyk's results. Development from the No. 3 shaft in the southern part of the property showed up better than in the preceding quarter: 340 ft. or 21 per cent of that sampled proving payable, averaging 14.3 dwt. over 11 in. or 157 in.-dwt. This contrasts with payability of only 1.5 per cent in the June quarter when values also averaged 157 in.-dwt. Total development was 14,980 ft. against 13,027 ft., while 7,725 ft. was sampled against 6,560 ft.; the pay ratio of 29 per cent went against 27 per cent previously, and the value of 239 in.-dwt. compared with 213.

Of the other mines of the group, Geduld and East Geduld did more work; the latter accomplished 566 ft. of development on the Kimberley reef but none of the footage was sampled. Main reef payability was down to 32 against 52 per cent but value increased to 225 in.-dwt. Although rather more development was done by Geduld on the Black reef as likewise the footage sampled of 3,505 ft., the pay ratio was again poor, 9 per cent though the value of 270 in.-dwt. went against 153 previously.

Grootvlei's payability was 54 per cent against 50 per cent from a larger footage of work done and sampled—11,175 ft. against 10,800. The value of 200 in.-dwt. was about the same. Although Marievale's pay ratio of the 3,675 ft. sampled on the Main reef was slightly lower at 50 per cent, the in.-dwt. of 268 went against 248. The Kimberley reef result was better; of the 1,560 ft. sampled payability was 55 per cent (against 39) and the value came out at 297 in.-dwt., whereas the previous quarter was only 241 in.-dwt.

JOHNNIES GROUP

Although a larger footage of reef was sampled by three of the Johannesburg Consolidated five producing mines, and pay ratio was better in some cases, none of the values were as good as those of the June quarter.

An increase of tonnage enabled Randfontein's costs to be held static at 27s. 8d. The diminished revenue from gold sales at a premium and the increased capital expenditure was slightly more than compensated by a tax reduction. The payability percentage fell off from 35.4 to 30.9 in development and value of 234 in.-dwt. went against 239.

Government Areas footage sampled of 10,885 gave 59 per cent payability and a value of 225 in.-dwt. compared with 254 in.-dwt. previously. There was a dwindling of payable reef percentage with New State Areas—the figure being only 50 per cent against 77 previously while the value of 203 in.-dwt. went against 275. Working profit came out at £1,203 (against a small loss in the June quarter) which however was buttressed by an income of £13,322 from premium sales while the amount from this source last quarter was £16,334.

The small footage of 675 sampled by East Champ d'Or gave a pay percentage of 71 and a value of 178 in.-dwt. Wit Gold's footage sampled of 1,250 ft. gave a pay ratio of 43 per cent which was almost double that of the previous quarter, though the value was down at 195 in.-dwt.

GENERAL MINING—ANGLO TRANSVAAL

West Rand (of General Mining group) reported that development last quarter showed 61 per cent payability and values 321 in.-dwt. This went against 53 per cent and 285 in.-dwt. in the June quarter. "General's" other member—South Roodepoort, accomplished 7,101 ft. of work, of which 3,090 ft. were sampled giving 42.6 per cent payability; value 257 in.-dwt.

Development on the Main reef series of Rand Leases (Anglo Transvaal) showed 55 per cent payability and average values of 241 in.-dwt., contrasted with 70 per cent and 255 in.-dwt.

Stilfontein (Strathmore Management) disclosed 100 per cent payability in the September quarter. 8,689 ft. were developed on the Vaal reef horizon from Charles shaft, of which 3,345 ft. were on reef and sampled, all proving payable; average value was 45.5 dwt. and width 5.8 in. or 264 in.-dwt. Charles shaft has reached its final depth of 3,145 ft.; the Margaret shaft is down to 2,646 ft.

PROGRESS IN THE ORANGE FREE STATE

There were several reminders in the September quarterly reports that progress in the O.F.S. is going well forward. A bigger footage was sampled by St. Helena (Union Corporation)—3,730 ft. and payability of 27 per cent was a little better than in the June quarter but went against 78 per cent in the corresponding quarter of last year. Average value was 11.3 dwt. over 21 in. First monthly declaration of output is likely to be made in respect of November; meantime news has come forward of the pouring of the first gold bar.

The Anglo American Corporation reported that results of development at Welkom showed an increase in payability—67 per cent against 53; values were 352 in.-dwt. against 342 and footage sampled on the Basal reef increased from 6,255 ft. to 8,985 ft. Various sections of reduction plant have been brought into operation for metallurgical test purposes. Since the end of September, No. 1 and No. 2 shafts have been connected. Reef strikes in No. 1 and No. 2 shafts of Western Holdings have also been announced since the company's quarterly report was published. President Brand's No. 1 shaft was reported in the September report to be at a depth of 3,018 ft. and No. 2, 2,419 ft. On Free State Geduld, No. 1 shaft had reached 3,811 ft. and No. 2, 4,524 ft. Good progress was reported to have been made with shaft sinking at Loraine.

In "Freddies" September quarterly report details were given of further reef strikes in the PP.1 borehole situated on the south-western boundary of Freddies North. Results throw some doubt on whether the upper reef at 4,658 ft. can be taken as a southward extension of the notable upper reef discoveries in the Van den Heaversrust area further to the north. As regards Johannesburg Consolidated's other O.F.S. members, it was reported that satisfactory progress is being made with the reduction plant at Freddies North and Freddies South. This latter company has subsequently announced that the Basal reef was intersected on the north side of No. 1 shaft at 4,790 ft. Sampling of 24 sections gave an average of 11.9 dwt. over 13.6 in., equivalent to 162 in.-dwt.

Two fresh boreholes were reported by "Geoffries" (General Mining), to be in progress in the company's area north-west of Odendaalsrus, Spes Bona and Weltevreden W.N.6. The Spes Bona hole is situated about 1,000 ft. west of VD.H.1 and W.N.6 about 1,500 ft. west of TV.2.

The most interesting news in the Anglo Transvaal O.F.S. mines quarterlies was the initial results from developments at Virginia. Out of 472 ft. advanced on the reef occupying the horizon of the Leader-Basal group, 465 ft. were sampled and 110 ft. or 24 per cent were payable averaging 6.48 dwt. over 33 in. or 214 in.-dwt.

The Central Mining reported that No. 3 shaft at Harmony had attained a depth of 1,974 ft. and that the Ventilation shaft was down to 2,415 ft. Forewarning was given of the increase in the company's capital to £3,750,000 by the creation of 3,000,000 new 5s. shares. Subject to U.K. Treasury consent they will be offered to shareholders upon conditions to be determined.

K.G.F. Companies Make Good Progress

The removal to India of the seat of management of the mines of the Kolar Goldfield took place last year. They are all incorporated in the State of Mysore and bear the new titles The Mysore Gold Mining Company (K.G.F.) Ltd., Nundydroog Mines (K.G.F.) Ltd., The Champion Reef Gold Mines of India (K.G.F.) Ltd., and the Ooregum Gold Mining Company of India (K.G.F.) Ltd. The sale became effective on April 1 last and the British vendor companies were allotted shares in the Indian company (full details of the new arrangement were given in *The Mining Journal Annual Review 1951*, on page 191). The four British companies thus became holding companies and their shares continue to be quoted on the London Stock Exchange. Messrs. John Taylor and Sons (India) Ltd., act as managers in India, while Messrs. John Taylor and Sons act as consulting engineers in London.

Originally it was intended that the sale of the company's undertakings through the new K.G.F. Company should take effect as from the end of 1950, the usual date on which the accounts were made up, but it was not possible to effect the completion of the sale by that date. Thus the current report and accounts issued by these four companies cover the period of 15 months, ended March 31, 1951 and compare with the accounts for the year ended December 31, 1949. It is intended in the future to revert to the former make-up date December 31, and thus the next accounts will cover a period of nine months to the end of the current year.

Company	Period	Milled (tons)	Yield (oz.)	Grade (dwt.)	Costs per ton* s. d.	Gold Proceeds £
Mysore	15 months	155,520	51,226	6.5	90 9	1,171,977
	Mar. 31/51	201,780	65,153	6.4	98 5	1,478,064
Nundy- droog	15 months	129,153	33,182	5.6	85 10	844,541
	Mar. 31/51	218,556	56,915	5.2	80 1	1,323,100
Champion Reef	15 months	99,240	51,022	10.0	103 11½	1,167,100
	Mar. 31/51	175,200	81,212	9.2	93 9	1,838,571
Ooregum	15 months	65,209	21,737	6.7	115 6½	500,799
	Mar. 31/51	117,349	32,527	5.5	93 9	734,024

*Excluding development.

Mysore Gold

The oldest mine of the group, Mysore Gold, has been in existence for 71 years. Although its mining operations were seriously affected by power shortages during 1950 for about six weeks in the middle of the year, and by fire in the early part of November, which interrupted operations for the remainder of the year, as will be seen from the table below, it was able to crush more tons, improve its output, and increase total footage advanced as compared with the previous year.

Year ended	Milled (tons)	Yield (oz.)	Development ft.	Footage Payability %	Statistics Grade (dwt.)	Width (in.)
1949	155,520	51,226	11,908	31.8	27.5	25
1950	163,400	53,151	11,827	32.0	25.9	26

The profit and loss account compares results of the 15 months ended March 31, 1951 with that of the 12 months ended December 31, 1949, and shows that mining revenue advanced to £1,409,211 against £1,048,745. However, it should be remembered that the latter figure includes nine months' operations before devaluation. Working profit was £149,401 compared with £35,588 for

the previous 12 months. From the £196,302 (£144,205) available, the sum of £118,400 was provided as reimbursement to the successor company in respect of Indian income tax for 1951/52, a further £1,475 was required to meet liabilities for Indian taxation on the 1949 profits, the dividend of 5 per cent, free of U.K. tax, absorbed £30,500 and after allocating £40,000 (nil) to general reserve, the balance to be carried forward was £4,475 against £9,949.

Payable ore reserves declined 24,600 tons to 261,200 but the average grade was higher at 12.3 dwt. per ton against 11.9 dwt. per ton.

Nundydroog Mines

The report and accounts for the 15 months ended March 31, 1951 of Nundydroog Mines disclosed a working revenue of £171,411 (£108,805) and a working profit of £65,295, against a loss of £11,967. An amount of £76,171 (£59,299) was available for appropriations, of which £65,700 was provided as reimbursement to the successor company, and the dividend of 3½ per cent free of tax took the remainder, £10,471.

There was an improvement in the ore reserve position, payable reserves at March 31 last being 322,570 tons averaging 10 dwt. per ton compared with 225,003 tons averaging 10.5 dwt. per ton. Costs per ton excluding development declined by 5s. 9d. to 80s. 1d. in spite of the power cuts.

Champion Reef

Operations at Champion Reef during the year 1950 were adversely affected by power cuts and a fire in the north section. Nevertheless, development footage increased to 9,663 ft., compared with 5,778 ft., 33 per cent proving payable at an average grade of 20.8 dwt. per ton over a width of 30.8 in. An impressive feature of the directors' report was the disclosure that costs per ton, excluding development, declined from 103s. 11½d. per ton to 93s. 9d. per ton. The ore reserve position remained virtually unchanged, and at March 31 last payable ore reserves stood at 527,409 tons averaging 11.4 dwt. compared with 525,130 tons at the end of 1949 averaging 11.8 dwt.

The advance in working profits was big, rising to £440,718, against £41,880 for 1949. From the £461,400 available from the 15 months' operations, £293,000 was provided as reimbursement to the successor company, £5,867 was paid out to meet taxation liabilities on the previous year's accounts and the two dividend payments aggregating 20 per cent required £66,993. General reserve received £70,000 (nil) and the carry forward amounted to £25,540 against £3,658 at the end of 1949.

Ooregum

The profit and loss account of Ooregum for the 15 month period ending March 31 shows that working profit amounted to £51,904 against £4,555 for the year ended December 31, 1949. From the £68,147 available, £50,000 was provided as reimbursement to the successor company, £1,904 to meet taxation liabilities on the 1949 profits, and the remainder, £16,243, was required to meet the preferential dividend of 5½ per cent, free of U.K. tax, and the dividend of 2½ per cent paid on both preference shares and ordinary stock. Costs per ton were reduced substantially during the year, being 93s. 9d. for the 15 months ended March 31 as against 115s. 6½d. for the year ended December 31, 1949. Payable ore reserves modestly improved, the figures for the latest account date being 155,026 tons, averaging 9.15 dwt. per ton against 148,044 tons averaging 9 dwt. per ton.

Company News & Views

Goldfields Group Increase Profits

New Consolidated Gold Fields of South Africa, the whole of whose issued capital is owned by Consolidated Gold Fields of South Africa reports that group profits of the Consolidated Gold Fields group for the year to June 30 last were £2,269,459 compared with £1,744,450 a year ago—an increase of £525,009. Included in this figure was £1,219,560 (£1,007,925) representing gross investment income and £85,450 (£217,952) in respect of recoveries of amounts previously written off.

Group taxation on profits for the year totalled £1,178,924 (£752,970), the sum of £120,000 (nil) was allocated for staff pensions, and after transferring £150,000 (£120,000) to depreciation reserve, and £201,719 (£219,500) to general reserve, the available net group profit for the year was £553,438 against £600,016. To this figure was added £870,369 (£687,724) brought in, but after deducting £49,774 (£29,621) attributable to outside shareholders and £427,969 (£387,750) required to meet the dividend payments made by New Consolidated Gold Fields, the profits of the Consolidated Gold Fields group carried forward amounted to £946,064 compared with £870,369 previously.

The directors state that the amount of gold sold at premium prices by the South African gold mining industry averaged 400,000 oz. per month, or approximately 40 per cent of the total output for the twelve months to June 30 last. This brought to the gold mining companies affiliated to the Transvaal Chamber of Mines, additional revenue of £5,462,000 equivalent to an excess of 9 per cent over the normal price. While this difference is not great it plays an important part in preventing profits from being squeezed unduly by rising working costs. A clear idea of the present position with regard to the ratio of profits to costs can be gained by examining the results of the individual mines in the group given in tabular form with the report and accounts. These results show that even after taking into account the additional revenue received from premium gold sales, which represented 1s. 10d. per ton milled, only four companies in the group out of nine were able to show higher working profits during the year to June 30, 1951 compared with the previous year. Moreover, four of the mines also showed greater capital expenditures. These two features thus provide a simple explanation for the recent downward trend of dividend payments—although in this connection it should be pointed out that the parent company, Consolidated Gold Fields recently raised its dividend from 12½ per cent, which had been maintained at this level since 1943, to 15 per cent.

The latest balance sheet shows that the group's total investments at or under cost of £10,686,432 remained practically the same as in the previous year when it was recorded at £10,769,086.

The Consolidated Gold Fields meeting will be held in London on December 13. Mr. Robert Annan is chairman.

Gold Fields Rhodesian Higher Investment Income

The principal shareholdings of Gold Fields Rhodesian Development as at May 31, 1951, were in mining companies operating on the Rand, in the Orange Free State and in Southern Rhodesia, Australia and America.

Year to May 31	Gross Revenue	Expenses	Tax	Net Profit	Divi- dend	Carry Forward
	£	£	£	£	%	£
1950	139,341	44,870	22,196	72,275	7.5	26,149
1951	113,842	32,388	23,439	58,015	5.0	31,165

The profit and loss account showed that while gross revenue declined, gross income from investments moved up from £38,214 to £51,621. Expenses were lighter,

largely due to the drop in expenditure on prospecting, which fell to £13,583, compared with £24,207 previously. Taxation liabilities remained virtually unchanged but net profit declined by more than £14,000 with the result that the dividend distribution was less than in the previous year.

While Gold Fields Rhodesian is not one of the major mining finance houses, it is a well managed and directed company in the Consolidated Gold Fields of South Africa group, and included in its portfolio of investments are some first-class companies.

The annual meeting will be held on December 4. The chairman is Mr. Robert Annan.

Venterspost Distributes Less

Native labour shortage during the year to June 30 caused a decline of 52,000 tons in the tonnage milled of Venterspost.

Year to June 30	Milled (tons)	Yield (oz.)	Grade (dwt.)	Profit per ton s. d.	Ore Reserves tons	dwt.
1950	1,315,000	280,056	4.2	19 7	3,132,000	5.1
1951	1,263,000	266,301	4.2	19 7	2,790,000	5.2

This factor, together with the lower yield per ton and the rise in working costs of 3s. to 34s. 11d. per ton, offset the rise in revenue per ton of 3s. to 54s. 6d. which included an amount equivalent to 2s. per ton (£128,918) received from the sale of gold at premium prices. The net result was that working profit declined by £50,441 to £1,239,603. Taxation charges were heavier and after allocating £231,953 to reserve bringing that account up to £1,786,953 to reserve bringing that account up to £1,786,953 and distributing 2s. 1d. per 10s. share the carry forward was reduced by £15,134 to £43,420.

Year to June 30	Working Profit	Tax	Net Profit	To Reserves	Divi- dend	Carry Forward
	£	£	£	£	%	£
1950	1,290,044	258,405	933,175	355,000	26½	58,554
1951	1,239,603	456,073	727,235	231,953	20½	43,420

Development footage advanced during the year amounted to 61,007 ft., a decrease of 5,481 ft. in comparison with the previous year. Footage sampled totalled 24,545 of which 16,475 ft. equal to 67.1 per cent proved payable at an average value of 6.3 dwt. per ton over an estimated width of 57.5 in.

North Kalgurli Strengthens Its Reserves

Although North Kalgurli (1912) crushed more tons during 1950 than in the previous year, the decline in the grade by 0.6 dwt. per ton resulted in a drop in output of some 4,000 oz.

Ore Reserves						
Year to Jan. 2	Milled (tons)	Yield Value (oz.) (dwt.)	Positive (tons)	Value (dwt.)	Probable (tons)	Value (dwt.)
1950	232,393	63,264 5.8	1,533,438	5.8	806,060	5.1
1951	244,066	59,063 5.2	1,583,831	5.7	731,110	5.0

Nevertheless, in the year under review, the company had the benefit of the higher price for gold for the whole year thus yielding a higher mining revenue than in the preceding year. Unfortunately, the rise in mining costs bit deeply into earnings and with taxation slightly higher, net profit remained virtually the same as in 1949.

Year to Jan. 2	Mining Revenue	Mining Costs	Tax	Net Profit	Dividend	Carry Forward
	£	£	£	£	%	£
1950	645,321	434,703	112,050	87,744	112.5	38,523
1951	734,132	519,026	113,200	89,801	100.0	42,403

The total distribution on the issued capital of 1,100,000 shares of 2s. each was less, but on the other hand, the company was able to set aside a sum of £25,000 (nil) to reserve for contingencies and increased its carry forward.

The annual meeting will be held in London on December 12. Mr. C. T. Ley is chairman.

Lampa Mining Pays 10 per cent

Although the grade of matte declined, in copper from 33.7 per cent to 31.3 per cent and in silver from 304 oz. to 237 oz. per ton, the Lampa Mining Co. during the year to June 30 last on balance produced more of both metals. Costs again advanced but the better prices obtained for both copper and silver offset this adverse feature with the result that proceeds from the sales of ore moved up from £87,283 to £120,189. Mining costs were heavier, £87,691 against £62,644 as were tax liabilities but net profit still showed an advantage over the previous year being £15,782 against £12,394.

Year to June 30	Production Results			Ore		Net		Carry	
	Matte (tons)	Copper (f. tons)	Silver (oz.)	Proceeds £	Profit £	Profit £	Forward £	Forward £	Forward £
1950	763	257	233	87,283	12,394	7,533			
1951	1,049	329	249	120,189	15,782	8,513			

The sum of £24,972 (£19,620) was available out of which £2,284 was used to extinguish the exchange suspense account, £2,000 was appropriated to write down the value of its holding in Limbani Syndicate, £8,500 (£9,200) was set aside as reserve for U.K. income tax on the year's profits and after distributing a net amount of £3,675 to meet the higher dividend payment of 10 per cent (7.5 per cent) the balance remaining, £8,513, was carried forward against £7,533 previously.

For years the company has been seeking a more straightforward, more efficient and more economical method of treating their ores than their existing practice of smelting it in conjunction with ores for fluxing purposes. This has meant that selective and therefore costly mining operations have had to be followed to the long term detriment of the mine. However, the chairman, Mr. J. Shirley Esplen, in his statement circulated with the report and accounts, states that a method of calcination and flotation has been tried out on a laboratory scale with good results and that if difficulties of plant design can be overcome the adoption of this new method may well help Lampa enter a new period of prosperity.

A Plain Man's Guide to Gold Shares Valuation

During recent years there have been many changes in investment habits and these have been particularly noticeable since the end of the last war. The precarious financial position of the United Kingdom, coupled with a political persecution of investors, has upset a number of traditional principles of investment and has attracted an entirely new clientele to mining shares.

Many investors, including institutions and trustees, have found it necessary to widen the scope of their portfolios, and have therefore decided to invest money abroad as a matter of policy and even of security. Hence the greatly increased interest in overseas mining shares. The Rand goldfield, with its comparatively regular reefs and its creditable history, has attracted a great deal of this new attention.

In these circumstances, writes our Stock Exchange Correspondent, the *Economics of South African Gold Mining*, recently published in Johannesburg by Messrs. R. E. Wallace and A. S. Robertson should fill a long felt want among investors who have long been seeking some background reading which was accurate without being too technical.

This book gives an exceptionally clear and readable description of the various reef formations of the Witwatersrand system and explains their inter-relation. Prospecting and mining methods employed are also made very understandable. The first portion of the book is illustrated with some excellent diagrams, and all mining and technical terms used are explained in a glossary.

The second part of the book discusses the interpretation of company reports and accounts and explains how they can be used to assess share values.

Of particular interest in this part of the book is the detailed explanation of the assessment of reef values and their effect on working costs. Some investors are apt to accept in-dwt. figures at their face value without further enquiry, and the effects of relative reef width and value factors is sometimes imperfectly understood. Another point which is often disregarded is the lease formula and government tax arrangements. These have an important bearing on the relative values of new mines in the development stage and repay careful study.

Finally, the investment value of gold shares *vis-a-vis* industrials is fully discussed, and trustees may find some of the comments made in this chapter helpful in deciding whether or not to enter the Kaffir market.

Tables, examples, and mathematical calculations in this second part of the book are mostly contained in detailed notes at the end and calculations written into the text are kept to the minimum. Some of the calculations in the Appendix, although exceedingly interesting, are likely to attract only the professional investor and those who have kept their mathematics in good repair.

To sum up, Messrs. Wallace and Robertson have certainly produced a very readable, useful and topical work, which should prove useful to investors.

The book is priced at 42s. and is distributed in Great Britain by *The Mining Journal*.

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Company Shorts

Strathmore's New Klerksdorp Venture.—An announcement from Strathmore Consolidated Investment Co. over last week-end foreshadows the formation of a new gold mining company to be known as the Ellatou Gold Mining Company which will operate in the Klerksdorp district of the Transvaal.

The announcement stated that the new company will, in due course, acquire the mineral rights over the farms Strathmore 15 and Nooitgedacht 53 and make application for a mining lease. The two farms, which are approximately 1,230 morgen in extent, lie between Klerksdorp town lands to the north and the Western Reefs mining lease to the south and east.

Strathmore Consolidated Investments through its wholly owned subsidiary Strathmore Exploration will hold 37½ per cent of Ellatou Gold's share capital and the balance will be held as to 37½ per cent by Eastern Rand Extensions, 20 per cent by Anglo Transvaal Consolidated Investment and the remaining 5 per cent by other companies.

Several new borehole results on the farms mentioned were given with the announcement and these drilling results on the Vaal Reefs are given in the table below.

Borehole	Depth (ft.)	Value (dwt.)	Corrected Width	Value (in.-dwt.)
S.1*	—	—	—	—
S.1†	797	36.6	35.2	1,289
S.2*	—	—	—	—
S.2†	943	0.3	23.1	7
S.2‡	944	1.0	5.7	6
S.3*	—	—	—	—
S.3†	979	6.46	12.1	78
S.3‡	980	10.5	16.8	176
S.5	268	3.6	13.8	49
S.5†	270	2.95	24.2	72
S.6	323	13.3	26.0	346
S.6†	324	11.7	33.6	393
S.8	—	Faulted out		
S.10	—	Drilled back of sub-outcrop of reef		
N.2*	—	—	—	—
N.2†	985	5.95	38.1	227
N.2‡	984	9.1	36.3	329
N.3*	—	—	—	—
N.3†	1,095	6.3	30.5	194
N.4*	—	—	—	—
N.4†	—	Faulted out		
N.5*	—	—	—	—
N.5†	1,724	6.7	17.7	119
N.6	210	5.1	6.9	35
N.6†	—	Faulted out		
N.7	1,476	18.6	19.2	357
N.8	302	7.5	11.3	84
N.8†	301	3.5	10.4	36
N.9	—	Faulted out		

* Original old borehole drilled by former owners.

† First deflection.

‡ Second deflection.

In boreholes S.5, S.6, N.2, N.5, and N.8, the core was lost.

In boreholes deflections S.1, S.2, N.3, and N.7, core recovery was almost complete.

The original borehole N.6 cut a remnant of reef on a fault plane.

In addition to the above Vaal reef intersections a Leader reef approximately 10 ft. above the Vaal Reef was intersected in all boreholes but carried payable values in only two. These were the S.6 in which the Leader was intersected at 314 ft. averaging 13.55 dwt. over 10.4 in., or 141 in.-dwt., and in a deflection at the same depth assaying 4.25 dwt. over 11.2 in., or 141 in.-dwt. In both cases the core was lost.

The second borehole, N.2, cut the Leader at 972 ft. averaging 6.45 dwt. over 80 in., or 516 in.-dwt., and in a deflection at 973 ft. yielded 4.35 dwt. over 79.1 in., equivalent to 344 in.-dwt. In both these intersections core recovery was almost complete. Drilling is in progress in boreholes S.7, S.9 and N.10.

The feature of the drilling results lies quite as much in the encouraging values obtained as in the shallowness of the reef which presumably was cut over a wide area. Thus it is tempting to say that Ellatou Gold Mining should reach the production stage for a relatively small capital outlay as shaft sinking expenditure, always a heavy item, should be moderately light.

Rooiberg Minerals Development Enjoys Excellent Year.—Rooiberg Minerals Development during the year to June 30 last shattered most of its former operating records. Tonnage milled and total of concentrates recovered were all time highs as was the profit per ton produced, and if the recovery grade did not create a new mark it was well up to standard.

Year to June 30	Milled (s.tons)	Recovery %	Conc. Recovered (l.tons)	Profit Equiv. (tonnes)	Tin Sales £
1950	29,507	1.19	527	351	228
1951	36,496	1.34	752	495	696
					201,643
					498,217

These impressive results reperused very favourably on the profit and loss account with the result that net profit, after charging £93,580 (£13,865) for taxation, amounted to £251,216 compared with £66,362. From the £368,951 (£100,206) available, £14,983 (£2,635) was appropriated for capital expenditure, £3,584 (£1,336) was allocated to the employees' fund and £45,000 (£20,000) to reserve. Dividend payments were stepped up from 17½ per cent to 87½ per cent leaving £36,804 (£22,370) to be carried forward.

"Tanks" Profits Almost Doubled.—Profit for the year to July 31 last of Tanganyika Concessions after all charges including taxation expanded sharply from £589,022 to £1,101,676, an increase of £512,654. This figure was struck after charging profits tax (34 months) of £63,655 (£180,000), income tax nil (£6,563) and S. Rhodesian tax of £3,300 (nil).

A final dividend of 15 per cent payable out of current profits is recommended which follows on the payment of a special ordinary dividend of 10 per cent payable out of reserves as at July 31, 1950, thus confirming the board's intentions of distributing 25 per cent before the White Paper proposals on dividend limitation were announced. This compares with 12 per cent paid previously. Dividends on the preference stock total 8 per cent, the book cost of interest in Tanganyika Holdings is written down by £100,000 and the profit recorded on redemption of Benguela Railway Debentures credited to capital reserve was £218,700 (£239,470).

The above results were announced in a preliminary statement and the figures are subject to final audit. The annual meeting will be held in Salisbury, Southern Rhodesia, on January 17. Mr. M. Hely-Hutchinson is chairman.

Rand Leases (Vogelstruisfontein) Gold Mining.—Gold sales (including an amount of £165,825 received in respect of premium gold sales of Rand Leases for the year to June 30 last) was £4,611,550 against £4,621,737. To this figure was added receipts from sales of silver and osmium amounting to £13,803 (£11,685) giving a total revenue of £4,655,354. Working costs were slightly higher at £3,359,299 (£3,341,628) and after this charge, together with expenses etc., were provided for, there remained a balance of £1,238,066. This figure was augmented by income from rents, interest, dividends and an insurance claim, bringing the total amount available to £1,284,739. Taxation called for £463,000 (£445,000), dividend payments aggregated 40 per cent (35 per cent) on the issued capital of £3,600,000 shares of 10s. each, absorbing £720,000 leaving the carry-forward higher at £316,272 compared with £214,533 previously. The annual meeting will be held in Johannesburg on November 27. Mr. S. G. Menell is chairman.

"Casta" Pay 100 Per Cent.—Consolidated African Selection Trust, the West African diamond producer, in a preliminary statement announce profits for the year to June 30, 1951, of £2,697,423 against £2,366,255, an increase of £331,168. Taxation was appreciably heavier being £474,786 higher at £1,717,286 thereby reducing group net profit to £980,137, a decline of £143,618 compared with the previous year.

Appropriations were less than a year ago although £200,000 has been set aside for taxation contingencies which may very well provide a useful cushion for any future provisions which might have to be made if the Conservative Government bring in their E.P.T. proposals. Another feature of the statement was the drop in the carry forward to £117,533 compared with £442,680 previously. However, this was arrived at after distributing 100 per cent—5s. per share—against 80 per cent.

The distribution is not an ungenerous one and with diamond sales running at an all time high during the current year shareholders have every chance of seeing the same distribution next year but as is well known the diamond trade is prone to rather large fluctuations in earnings.

Welgedacht Exploration has announced that the debenture registers will be closed from 12th to 31st December, 1951, both days inclusive, and that cheques in payment of interest at 5 per cent per annum for the half year ending 31st December, 1951, on the outstanding amount of the debentures (viz., 17s. 4d. in respect of each £1 of the original face value of the debentures) will be posted to registered debenture holders on December 31, 1951.

JOHANNESBURG CONSOLIDATED INVESTMENT COMPANY

A SATISFACTORY YEAR

MR. H. J. JOEL'S REVIEW

The Annual General Meeting of Johannesburg Consolidated Investment Co. Ltd., was held on November 20 in Johannesburg.

Mr. H. J. Joel, in the course of his speech, said:

The Company experienced a satisfactory year, despite fewer opportunities for dealing profitably on the stock and share markets, making a profit of £1,628,647, as compared with £1,381,684 for last year. After charging £745,110 for taxation and adding £351,929 brought forward from 1950, the amount available for dividend and other appropriations was £1,235,466. A sum of £500,000 was transferred to general reserve, which now amounts to £5,500,000. Dividend No. 59 of 3s. 6d. per share, less United Kingdom income tax at 9s. 6d. in the pound, absorbed £362,906 and there remained a balance of undistributed profits amounting to £372,560, reflecting an increase of £20,631.

GOLD MINING INDUSTRY

Generally speaking, the year under review has been a satisfactory one for the gold mining industry, although one disturbing feature that still manifests itself is the continued rise in working costs. It is just over two years since the industry received a higher official price for its gold and it is of interest to examine the trends of cost and revenue which have taken place during that period.

In September, 1949, costs were 26s. 7d. per ton milled, while by September, 1951, they had risen to 32s., an increase of 20.4 per cent. The question whether costs will continue to rise, and if so, at what rate, is a matter of vital concern to the industry. It would be unwise to ignore the fact that unless the rise in working costs can be halted, the low-grade mines of the industry will within a few years be faced with difficulties as acute as those with which they were confronted in the early part of 1949.

The rates of tax applicable to the gold mines already discriminate severely against them and further increases can only have a deleterious effect on our economy by tending to frighten away the risk capital which is still required in large amounts.

The ever-increasing requirements of the industry for native labour is a matter of great concern to all its members. There is every reason to be hopeful that the gold mining industry will be successful in its endeavours to recruit the necessary labour force. At the present time 22 shafts are being sunk; three mines are developing, on two of which the reduction plants are now operating; and it is likely that within the next few months a further four mines, including the two Freddie's mines, will have commenced development.

OTHER INTERESTS

Diamonds: Despite the fact that all diamond producers are working to maximum output, the supply of diamonds is still short of the present world demand. For the nine months to September 30, 1951, sales amounted to £49,694,000, compared with £35,103,000 for the nine months to September 30, 1950. There seems little doubt but that 1951 will be a record year for the diamond industry.

Copper: The Northern Rhodesian Copper Producers have had another very successful year. The world demand for copper continues strong and the Ministry of Supply's controlled price to consumers of electrolytic copper is at present £227 per ton.

Their profits show a substantial increase over those earned in the previous year, and they have been enabled to pay materially increased dividends and still transfer large sums to reserves.

Platinum: A strong demand for platinum has been maintained and the policy of keeping the metal at a stable price in order to encourage industrial users has been continued. Rustenburg Platinum Mines Ltd. has embarked upon a major scheme of expansion to increase output, both at its Rustenburg and Union Sections, and it is hoped to bring the combined milling capacity of those mines up to 125,000 tons per month within two years.

Coal: The tonnage sold for the collieries of the group during the year ended June 30, 1951, was 77,578 tons greater than the sales for the preceding year. Since June 30, however, the position has deteriorated and the output of our collieries has been severely curtailed owing to irregular supplies of railway trucks.

Lead-Zinc Interests: A controlling interest is held in the Abbeytown Mining Co. Ltd., which operates a lead-zinc mine in County Sligo, Eire. Arrangements for increasing the output are on the point of completion. In North Wales progress in erecting the reduction plant of the Llanrwst Lead Mines Ltd. is slow owing to difficulties in obtaining machinery and materials. It is hoped, however, that the mill will be in operation early in 1952.

The report was adopted.

BLYVOORUITZICHT GOLD MINING COMPANY

The Fourteenth Annual General Meeting of Shareholders of the Blyvooruitzicht Gold Mining Co. Ltd. was held in Johannesburg on November 20, 1951.

Mr. W. M. Frames, Chairman, presided and said: Throughout the gold mining industry results on the producing mines were influenced during the year by a shortage of labour and by an increase in unit working costs. These factors had an important bearing on the position at your mine and retarded the rate of expansion of operations and of profits. It was, nevertheless, possible to increase the tonnage milled steadily and as a result of the higher gold output and extra receipts from sales of gold at enhanced prices, the Company's working revenue increased by £1,752,969 to £10,007,728 and the net profit by £1,343,085 to £7,564,603.

Before commenting on the position at the mine, I should like to refer to the policy adopted by the Company in the early stages of opening up the property and to the general trend of development and mining operations thereafter.

The original plans included the sinking of two main shafts from both of which it was intended to undertake normal underground development. Work was accordingly started in 1937 on No. 1 Shaft and in 1938 on No. 2 Shaft, situated some 5,000 and 7,000 ft. respectively from the eastern and western boundaries. Due to the subsequent war conditions and the consequent difficulty of acquiring additional capital and equipment, it was decided in 1940 to suspend sinking operations at No. 2 Shaft and conserve resources for the development of the reef from No. 1 Shaft. Fortunately the high values disclosed warranted the immediate erection of a unit of the reduction plant for the crushing and treating of ore from development operations in order to finance the cost of further development. Sinking was recommenced at No. 2 Shaft in 1944 and in the following year, as a result of a connection made with the sixth level west from No. 1 Shaft, it was possible, in accordance with the mining regulations, to commence stoping operations. Reef development from No. 2 Shaft was, however, retarded for various reasons, such as the late delivery of plant and equipment and the presence of troublesome water-bearing fissures, and did not reach material proportions until 1948. By this time the scale of operations had increased appreciably and the major portion of the eastern half of the mine above the seventh level had been blocked out.

The sinking of sub-incline shafts is at present proceeding satisfactorily, but a few years must elapse before the next series of levels is sufficiently opened up to contribute any material tonnage of ore to the mill.

During this period, therefore, the mill tonnage will be supplied from the area above the seventh level. There remains a substantial tonnage of high-grade ore in the available reserves in the eastern half of the mine but the proportion of stoping operations conducted in the western half will increase materially during the next few years. The yield will, therefore, depend to an increasing extent on the values which have recently been and are now being disclosed by the extension westwards of the existing levels. Values exposed in drives to the west of No. 2 Shaft, which averaged 253 in.-dwt. with 98.8 per cent payability during the past year, have continued in recent months to be below the average for the mine.

During the year the extensions to the reduction works were completed and the hoisting capacity at No. 2 Shaft was increased substantially. The steady improvement in the tonnage milled which occurred throughout last year has been maintained during the early months of the current year and in the absence of a deterioration in the supply of electric power or of an aggravation of the mine's present water difficulties, a further improvement should be recorded when additional non-European labour becomes available.

Furthermore, Shareholders have already been informed that gold mining revenue may in about two to three years' time be augmented by income from the sale of uranium. It is estimated that an additional 2d. per share will, as a result, become available for dividends each year over the following 10-year period, during which complete repayment will be made out of uranium revenue of a loan of some £2,500,000.

Details of operations during the first four months of the current financial year are as follows: tons milled 438,000; yield per ton 12.980 dwt.; revenue per ton milled 161s. 11d.; working costs per ton milled 44s. 0d.; working profit £2,582,101 to which was added £152,125 in respect of additional revenue from sales of gold at enhanced prices and sundry revenue of £17,212, giving a total profit of £2,751,438; development footage 14,597. A total of 5,520 ft. was sampled on the carbon leader, of which 5,210 ft. or 94.4 per cent was classed as payable averaging 48.9 dwt. over a channel width of 12 in. The average value of the footage sampled in the drives west of No. 2 Shaft since the close of the year is 262 in.-dwt.

The Report and Accounts were adopted.

CONSOLIDATED MAIN REEF MINE AND ESTATES

REVIEW OF OPERATIONS

At the Annual General Meeting in Johannesburg on November 20 the Chairman stated:—Your Company's mining property is roughly square in shape, covering an area of about 24 miles on strike and on dip equal to approximately 3,028 claims.

During the course of the 53 years since milling commenced, pay limits have fluctuated but have followed a general downward trend due to an increasing price of gold and, up till five years ago, to increasing tonnages and decreasing costs per ton milled. The reefs have, therefore, not always been mined consistently downwards and with each decrease in the pay limit there has been a return to old areas to pick up low-grade ore which had been left behind as unpayable in the past. This process is continuing to-day but is being severely curtailed by increasing costs.

The lowest of the five reef horizons is the Main Reef. This reef has opened up much better at depth, particularly in the south-western portion of the mine, where it is proving to be one of the main tonnage contributors and a material factor in the future life of the mine at depth. The next reef is the Main Reef Leader, which occurs at up to 20 ft. above the Main Reef; in the north-western portion of the mine, however, the leader lies immediately on top of the Main Reef forming the so-called composite reef. The Leader Reef has up till the present been by far the most consistent and important contributor to the mill, values being much higher but the width less than in the Main Reef. Roughly speaking, this reef has proved payable down to the 2,500 ft. horizon on the west and the 8,000 ft. horizon on the east. Below this north-west/south-east diagonal, which is roughly parallel to but a little to the north of the Bantjes Dyke, development on the Leader Reef has been disappointing. It is in this area to the south of the Bantjes Dyke, however, that the Main Reef has assumed increasing importance.

The South Reef occurs some 100 ft. above the leader and is generally similar in regard to width and value; it has proved fairly consistent from the outcrop down to about the 3,000 ft. horizon, thereafter becoming patchy and generally unpayable.

BIRD REEF

The Bird Reef lies about 1,700 ft. above the South Reef, is of lower grade than the three reefs below it but, like the Main Reef, is fairly wide. It only assumed economic importance after the departure from the gold standard at the end of 1932 and a further fillip was given to mining operations on this horizon by devaluation in 1949. Payability has proved fairly consistent in the western half of the property down to a depth of 3,000 ft., thereafter becoming patchy; in the eastern half of the mine, however, there is a large unpay zone between the 1,000 ft. and 2,000 ft. horizons, and on this side of the mine the reef is characterized by a fairly consistent pay zone parallel to the strike, followed by a wide unpay zone and then a further zone of enrichment. This reef is now the principal tonnage contributor to the mill.

During the last few years the low-grade but wide Kimberley Reef, which lies about 2,100 ft. above the Bird Reef, has been opened up in the eastern portion of the mine. While this reef has proved of material assistance in maintaining output since devaluation, present indications are that the payable zone on this notoriously patchy reef is confined to a depth of 1,000 ft. over a strike distance of about one mile on the eastern side of the mine. Due to their distance apart, each of the five reefs on the property has been developed independently by its own system of reef drives and raises, and has generally been mined separately.

The Main Reef Leader and the Main Reef are close enough together, however, to have enabled advance prospecting to be carried out by diamond drilling and by prospect winzling and raising. A certain amount of prospecting on the South Reef has also been carried out by drilling and raising from the horizon below.

The stage has now been reached, however, where primary development work on all reefs except the Main Reef has more or less ceased, as such work has failed to prove any extension of the broad zone of enrichment on each of the four reefs above the Main Reef. On these reefs development work is now confined to probing unexplored areas down dip by means of winzes in the hope of locating further zones of payability. Internal development work has yielded some satisfactory results, particularly on the Main Reef Leader and on the South Reef in the north-eastern corner of the property. Development by means of reef driving and a certain amount of winzling and raising continues on the Main Reef in the south-eastern portion of the mine, where a fairly large tonnage of ore has been blocked out, although this zone of payability has proved somewhat patchy.

The Report and Accounts were adopted.

NEW MODDERFONTEIN GOLD MINING COMPANY LIMITED

At the Annual General Meeting in Johannesburg on Nov. 20, the Chairman stated that although the working profit for the year was £23,127 higher than in the preceding year, it included an amount of £24,825, being the proceeds of a special declaration of gold derived from clean-up operations and a further sum of £15,330 in respect of gold sold at enhanced prices for industrial and artistic purposes, this latter item being a most welcome addition to the company's revenue.

In the upper levels of the north-western area of the property, to which mining operations are confined, there are now few further sources of payable ore. At present mining is taking place in the remaining ore reserve blocks, the tonnage being augmented by ore drawn from the South Reef drive and other pillars now available in that area. In recent years surface rock dumps and sand and slime accumulations have been a source of additional mill tonnages, but these are now practically exhausted. As a consequence, the mill tonnage will in the course of the next few months be slightly reduced to approximately 20,000 tons per month, most of which will have to be drawn from underground sources with a resultant increase in working costs. The higher pay limit which had accordingly to be fixed in calculating the ore reserve at June 30, 1951, resulted in a reduction of the reserve to the small figure of 32,500 tons. It will be apparent to Shareholders that with such limited reserves of ore, operations at the mine are now drawing to a close.

While every effort will be made to continue working at a profit, it must be pointed out that, as a scheduled mine under the terms of the Silicosis Act, the company incurred expenditure during the year totalling £70,391 in respect of assessments by the Silicosis Board for current levies and for additional outstanding liabilities created under the 1946 and 1950 legislation. Against this very heavy expenditure—which is equivalent to 5s. per ton milled—it was possible to offset a credit adjustment of £57,553 which arose due to the fact that the provision made by the company in earlier years to meet its proportion of the outstanding liabilities of the Silicosis Compensation Fund exceeded by that amount its assessment at March 31, 1950. The basis of apportioning the outstanding liabilities of the Silicosis Compensation Fund has been adjusted over a period of five years and the last of these refunds—the amount is not yet known—accrued to the company on March 31, 1951, and will be reflected in the current year's accounts. It is estimated that this credit will offset the expenditure of approximately £34,000 per annum on current levies for silicosis compensation during the year, but on April 1, 1952, further assessments, estimated to total about £22,000, will become due for the additional liabilities under the 1946 and 1950 legislation. Obviously, it would be to the company's disadvantage to remain in production as a scheduled mine after March 31, 1952, and thus incur this heavy expenditure, which is so disproportionate in relation to the small profits which the company is capable of earning at this stage of its life.

Unless, therefore, it should be possible for the mine to continue in small-scale operation for a period after the removal of its name from the list of scheduled mines—and at present it is not certain that this could be done—there appears to be no alternative but to terminate the company's mining operations finally at some date prior to March 31, 1952. This matter is, however, still being investigated carefully. Satisfactory progress was made during the year with the recovery of equipment and salvaging of material for sale. The question of realising the Company's freehold and other assets to the best advantage continues to receive close attention. As an item of special business at to-day's meeting you will be asked to consider a proposal to reduce the company's capital to £630,000 by returning in cash to Shareholders a further £70,000, equal to 6d. per share.

The Report and Accounts were adopted and the Special Resolution passed.

DIVIDENDS

Clutha River Gold 3% i (Dec. 18)
Consolidated Co. Buitfontein 7.5375d. (Jan. 28)
Ex-Lands Nigeria 20% i (Dec. 6)
Gopeng Consolidated 15% i (Dec. 14)
Kent (F.M.S.) Tin 25% i (Jan. 11)
New Jagersfontein Mining 2½%
Pengkalan 15% i (Dec. 21)
Powell Duffryn 4½% Cum. Pref. 2½% (Jan. 1)
Sir Lindsay Parkinson 7½%
South Kaiguri Consolidated 10% i (Dec. 19)
Tanjong Tin Dredging 25% i (Dec. 22)

i = interim

ANGLO-TRANSVAAL CONSOLIDATED INVESTMENT COMPANY

STRONG LIQUID POSITION

MR. S. G. MENELL'S REVIEW OF WIDESPREAD INTERESTS

In the course of his speech at the Eighteenth Annual General Meeting held in Johannesburg on November 16, 1951, **Mr. S. G. Menell**, the chairman, referred to the strong liquid position of the company and to the reserves totalling £3,889,000 disclosed by the balance-sheet at June 30, 1951. In addition the market valuation of investments showed an excess over cost of £581,000, while the surplus of current assets over liabilities amounted to £1,370,000.

In his review of the company's principal interests the chairman dwelt at some length on the prospecting activities of Middle-Witwatersrand (Western Areas) Limited in the Western Transvaal and the Orange Free State where the pioneering work undertaken had been fully justified by the results obtained. Firstly, there was the Sand River area, where the group administers two developing mines. Secondly, the Lucas Block, where we can look forward to the establishment of further mining operations to the south of Stilfontein where, as announced in June of this year, arrangements with the Anglo-American Corporation of South Africa Limited have been made for the financing of any mining lease companies. Thirdly, there was the Van den Heeverstrust area where there are good prospects of proving the existence of a payable area west of the Fredries North Lease. In twelve months over 32,000 ft. had been drilled in 10 boreholes and this rate was being maintained. In addition, investigations jointly with other companies had yielded encouraging results, which indicated the possibility of a further mining lease area to the north of the Harmony Mine and had established rights to participation in other potential lease areas.

Mr. Menell reported that the No. 1 shaft at the Virginia Mine at its present depth of 3,183 ft. was now less than 600 ft. above the expected reef horizon, while the No. 2 shaft at 2,909 ft. should reach the reef in less than 300 ft. The No. 3 shaft had reached its final depth, and development work therefrom had been commenced at 1,538 ft.

At Merriespruit, the intersection of water-bearing fissures had involved delay, but the No. 1 shaft had attained 2,300 ft., or well over half the anticipated depth.

Both the Village Main Reef Gold Mining Company (1934) Limited and Eastern Transvaal Consolidated Mines Limited had earned substantially larger profits and the latter company had resumed payment of dividends with a distribution of a 5 per cent dividend in respect of the year to June 30, 1951.

The company's producing base-metal mines had achieved notable success in the year under review. Associated Manganese Mines of South Africa Limited had almost doubled its profit at £1,119,412, paying dividends totalling 170 per cent. Consolidated Murchison (Transvaal) Goldfields and Development Company Limited had attained even more spectacular results, dividends for the year to December 31, 1950, of 140 per cent had been followed by the distribution of an interim dividend of 320 per cent actual in respect of the following half-year.

In the Northern Transvaal investigation of a copper zinc occurrence had indicated the existence of a small payable ore body, and arrangements were under way for initial production while further prospecting would continue.

The company was the major shareholder in West African Aluminium Limited, and as the result of pioneering work initiated in 1938, it now had the satisfaction that the project was accepted as a practicable economic enterprise. It envisaged the establishment on the Volta River, in Gold Coast Colony, of a hydro-electric power station, coupled with harbour facilities, of which the estimated cost of construction was of the order of £60,000,000. The related aluminium works and bauxite mines were likely to involve a further £40,000,000, and in this they were associated with the Aluminium Company of Canada. These large-scale plans would have far-reaching effects on the aluminium requirements of the sterling area and upon the economy of the Gold Coast Colony.

INDUSTRIAL INTERESTS

Steady improvement was being maintained despite persistently difficult trading conditions, of which the steel shortage was the most serious and intractable. Consolidated Glass Works Limited had notably improved in efficiency and had earned a profit of £106,787.

Improved results were also reported by Irvin and Johnson (South Africa) Limited, Anglo-Alpha Cement Limited, South African Torbanite Mining and Refining Company Limited, and the Union Lime Company Limited.

It was with the greatest satisfaction that the directors were able to include in their report a recital of the agreement reached with the South African Coal, Oil and Gas Corporation Limited. Your company originally sponsored the investigation of the production of oil from coal 16 years ago and in 1937 the late Mr. A. S. Hersov presiding as chairman at the annual general meeting of your company said: "I venture to say that the establishment of a South African oil industry based on coal is of national importance. Investigations have proved that the abundant reserves of cheap coal could be converted into oil by processes which have proved to be efficient and economic in other countries, particularly Germany. Our ordinary peace-time requirements are increasing rapidly and any interruption in supplies will paralyse industry and commerce. The long lines of communication between the sources of supply and the Union make this country particularly vulnerable."

These remarks by our late chairman have equal if not greater application to-day and in wishing this project every possible success I wish to record the satisfactory nature of the protracted negotiation with the Union Government. Your company has been appointed consulting mining engineers and consulting mechanical and electrical engineers to the colliery which SASOL will operate.

The chairman moved the motion for the adoption of the report and accounts which was seconded by Mr. H. C. Drayton, who in the course of his remarks said: "Shareholders can, I believe, be pleased with the pioneering spirit and achievements of their company—the oil from coal project, the discovery of new major gold bearing areas, the initiation of an important scheme for the production of aluminium, are only some of the principal ventures for which our company has had the primary responsibility, for which our company has for many years carried the chief burden and for which our company can claim most of the credit. It is ventures of this kind which require initiative, imagination courage, and invariably, above all, patience, that have been the keynote of our company's growth and for which we owe a debt of gratitude to those who are piloting our company and managing its affairs."

The motion was carried unanimously.

WITBANK COLLIERY, LIMITED

(Incorporated in the Union of South Africa)

Extracted from the ANNUAL REPORT for the Year ended August 31, 1951.

AUTHORIZED AND ISSUED CAPITAL £385,000 in 385,000 Shares of £1 each.

Net Profit for the year.....	£161,953
Balance unappropriated at August 31, 1950.....	124,884
Forfeited Dividends	9
Making a total of.....	£286,846
This amount has been dealt with as follows:	
Funds Transferred for Capital Expenditure	£36,736
Taxation.....	37,101
Dividends declared during the year:	
No. 89 of 2s. per share and No. 90 of 1s. 9d. per share.....	72,188
	146,025
Leaving a balance unappropriated of.....	£140,821

The coal despatched from the mine totalled 1,399,446 tons, an increase of 37,283 tons compared with the figure for the previous year.

The inability of the South African Railways to transport all the coal, for which orders were received, very seriously affected the output during the last few months of the financial year, whilst the curtailment of the export trade, enforced by the South African Government, resulted in a considerable drop in the average selling price per ton.

The full Report and Accounts may be obtained from the London Secretaries, A. MOIR & CO., 4, London Wall Buildings, London, E.C.2.

AMALGAMATED TIN MINES OF NIGERIA

CHAIRMAN'S STATEMENT

The Twelfth Annual General Meeting of Amalgamated Tin Mines of Nigeria, Ltd., was held on Monday last at 55-61, Moorgate, London, E.C.4. **Mr. J. Ivan Spens** (the chairman) presiding.

The following is the statement by the Chairman which had been circulated with the report and accounts:

The accounts for the year ended March 31, 1951, will, I hope, be considered by shareholders as satisfactory. The balance sheet shows a further strengthening in the company's financial position, but I have the following explanations to make on the sums put to two of the revenue reserves.

Royalty Equalization—Under the Nigerian Government's regulations, royalty payments are based on a percentage figure of the average price for spot tin in London during the previous quarter. During the period under review, the price of tin was rising, so royalty was paid on a lower figure than that which the company was receiving, and the figure of £113,000 represents the difference between royalties paid to the Nigerian Government and the amount which would have been paid had the royalty been calculated on the prices actually received by the company.

I would remind shareholders that in my statement last year I said that I did not believe that the heavy scale of royalties imposed was in the best interests of Nigeria. Representations have been made to the Government, so far without effect, but with the present price of tin and with steadily rising costs I hope the Nigerian Government will seriously consider the position.

In respect of the year to March 31, 1951, the Nigerian Government will receive in royalty £375,713 and in taxation £798,000, making a total of £1,173,713, which would have been increased by £113,000 if the company had to pay royalty on the amounts actually received by the company for its tin in the United Kingdom. I might add that I personally consider royalty should only be paid on the net proceeds of the tin concentrate f.a.s. the Nigerian port of shipment.

The following table may interest shareholders:

	%
Gross proceeds, plus interest and sundry receipts.....	100
All costs except royalty.....	41
Royalty and taxation, excluding the £113,000 for royalty equalization.....	41
Retained in the business	9
Dividends.....	9
	100

SPECIAL DEPRECIATION

Your Board considered it advisable to set aside £150,000 from the profits made in the year under review as special depreciation for equipment on order. There are in your company's leases many deposits which are not suitable to work with the present equipment, owing to the hardness of the ground. The new equipment which has been ordered, and which will cost some £375,000, is specially suited for the working of such deposits.

Production—As envisaged in my last statement, production again fell. Shortage of water in the Nigerian Electricity Supply Company's reservoirs led to drastic restrictions of power, both in April, 1950, and late in March, 1951. Major overhauls of the dredge and four of the draglines also slowed down production, and, as mentioned above, the hard ground encountered has reduced considerably the yardage treated by gravel pumps, but it is anticipated that with the arrival of the new earth-moving equipment production will again be stepped up.

Ore Reserves—New reserves brought in during the year under review rather more than balanced the reserves taken out by production, which is not unsatisfactory.

LABOUR

Apart from the trouble which I reported last year as having taken place in June, relations with labour have been good. The welfare department has continued to expand its activities. There are now six African welfare clubs, besides meeting houses, and two mobile canteens have been provided for outside camps to supplement the main canteens. The workers' councils continued to function satisfactorily.

Keffi Tin Co. Ltd.—The accounts of this wholly owned subsidiary are attached. Results were again satisfactory.

Lead-Zinc Areas—Further work has been carried out during the year under review, but more work, including diamond drilling will have to be undertaken before it can be ascertained whether the lodes go to depth and justify further investigation.

Staff—To Mr. H. E. Wilson, general manager of A.O. Nigeria Ltd., our managers, and to the European and African staff under him, I would again like to express the Board's appreciation.

The report and accounts were adopted; the retiring directors, Mr. A. L. Butler and Mr. J. R. Farquharson, were re-elected and, the other formal business having been duly transacted, the proceedings terminated.

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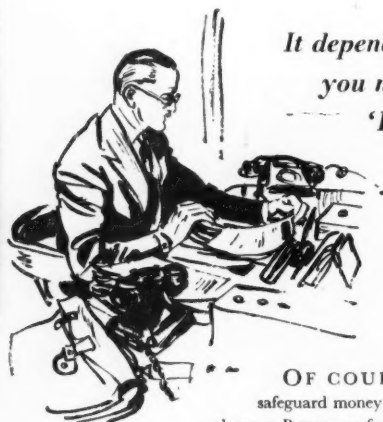
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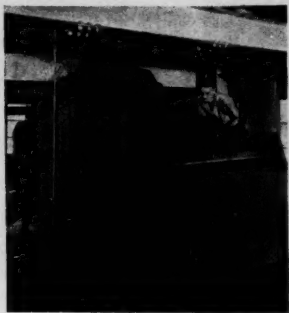
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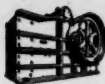
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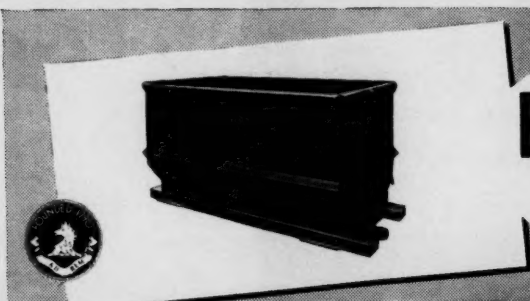
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